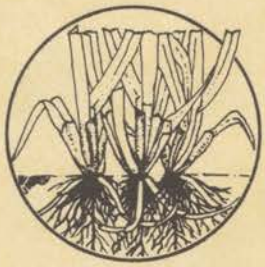

1993 Illinois Turfgrass Research Report

Horticulture Series 51
March 1994

Department of Horticulture and Agricultural Experiment Station • University of Illinois at Urbana-Champaign

This report was compiled and edited by Jean E. Haley, Senior Research Specialist, Department of Horticulture, University of Illinois.

Cover design by Joan Zagorski, Graphic Designer, Office of Agricultural Communications and Education.

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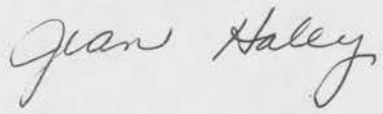
FOREWORD

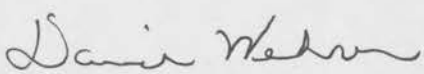
The *1993 Illinois Turfgrass Research Report* presents the results of turfgrass research investigations conducted in Illinois during 1993. Contributors include scientists from the Departments of Horticulture and Plant Pathology at the University of Illinois and the Department of Crop and Soil Sciences at Southern Illinois University.

Rainfall during the 1993 growing season in East Central Illinois was above average (Appendix C). Heavy rainfall coupled with above average minimum temperatures increased disease incidence and encouraged shallow turf root growth. Please keep in mind the weather when evaluating research submitted in this report.

We hope turfgrass managers throughout Illinois use the information presented here when making management decisions. Nevertheless, information about products and procedures contained in this report are not intended as turfgrass management recommendations. All uses of pesticides are registered by appropriate State and Federal agencies before they can be recommended. In addition, commercial companies are mentioned in this publication solely for the purpose of providing specific information. Product endorsement is not implied or intended.



Jean Haley, Editor



David Wehner, Associate Editor

ACKNOWLEDGMENTS

We wish to thank the following companies, and organizations for their support of our turfgrass research programs during 1993 through their contributions of time, materials, or funding at the University of Illinois and Southern Illinois University.

A-G Turf Farms
Agrico
Agrisorbents Product Group
Aimcor Corp.
American Turf Sod Farms
Arkansas Valley Seed Co.
Authur Clesen, Inc.
Baker Seed Co.
BASF Corp.
Beckman Turf & Irrigation
Belleville Seed House
Benck's Turf Nursery
BioPlus Mfg., Inc.
E.F. Burlingham and Sons
Cardinal Creek Country Club
Central Illinois Golf Course Superintendents Association
Central Sod Farms, Inc.
Champaign Country Club
Chicago Botanic Garden
Chicago District Golf Foundation
Chicagoland Golf Course Superintendents Association
Ciba Corp.
Coon Creek Sod Farms
Crestwicke Golf Club
Cushman-Ryan
Deere and Co.
Department of Animal Science, University of Illinois
Division of Intercollegiate Athletics, University of Illinois
DowElanco
Dunteman Turf Farms
Evergreen Sod Farm, Inc.
Floratine Products, Inc.
Forbes Seed Co.
Foxcroft Meadows, Inc.
Grace-Sierra

Acknowledgements continued:

Greener Gardens Sod Farm
Griffin Industries
Growmark
H & H Seed Company, Inc.
Hoechst-Roussel Agri-Vet Co.
ICI America
Clete Idoux
H & E Sod Nursery, Inc.
Huber Ranch Sod Nursery, Inc.
Illini F.S. Inc.
Illinois Lawn Equipment, Inc.
Illinois Natural History Survey
Illinois Nurseryman's Association
Illinois Turfgrass Foundation
International Seeds, Inc.
Iowa State University
ISK Biotech
Jacklin Seed Co.
Jackson Country Club
Jackson County Extension Service
Jacobsen Div. Textron Co.
Kane County Cooperative Extension Service
Kellog, Inc. Seed & Supplies
Lake County Cooperative Extension Service
Lebanon Chemical Corp.
LESCO Inc.
Lincolnshire Fields Country Club
Lofts Seed, Inc.
Medalist America
McHenry County Cooperative Extension Service
Michigan State University
Mid American Sod Producers Association
Midwest Association of Golf Course Superintendents
Miles Incorporated
Milwaukee Metropolitan Sewerage District
Monsanto Agricultural Co.
Mueller Farms, Inc.
Muellermist Irrigation Co.
National Seed Co.
National Turfgrass Evaluation Program
NK Lawn & Garden Co.
NOR-AM Chemical Co.
Northwest Illinois Golf Course Superintendents Association

Acknowledgements continued:

Olsen-Fennel Seed Co.
Olympia Fields Country Club
Outdoor Turf and Irrigation Supplies
PBI-Gordon
Pickseed West, Inc.
Dr. Herb Portz
Possibility Place Nursery
Prairie Gardens
Pure Seed Testing
Quality Turf Nurseries
Red Hen Turf Farm, Inc.
Rohm & Haas Company
Rhone-Poulenc Ag. Co.
Riverside Golf Club
Ruth Lake Country Club
Sandoz Crop Protection
Schaafsma Sod Farm
O.M. Scott & Sons Co.
Seaboard Seed Co.
Sherman's Small Engines
Silver Lake Country Club
Southern Illinois Golf Course Superintendents Association
Southern Illinois University, College of Agriculture
Southern Illinois University, Physical Plant
Spraying Systems Co.
Summit Seed Company
Tee-2-Green Corp.
Terra International
Thornton's Sod Nursery
Thornton's Turf Nursery
Toro Co.
Turf Products Ltd., Inc.
Turf-Seed Inc.
United Horticulture Supply
United States Golf Association
University of Illinois, College of Agriculture Experiment Station
University of Illinois, Grounds Department
Vaughan-Jacklin Corp.
Virginia Turf Farms
Zajac Performance Seeds
Zeneca Incorporated

UNDERSTANDING THE DATA

Most of the data presented in this report is subjected to statistical analysis. Statistical procedures are a combination of logic and arithmetic that allow us to interpret information gathered from experiments. We most frequently use Fisher's Least Significant Difference Test to explain our test data.

Fisher's Least Significant Difference Test is a statistical procedure that determines if the difference found between two treatments is due to the treatment or if the difference is simply due to random chance. For each set of data a value ($LSD_{0.05}$) is calculated at a chosen level of significance. If the difference between two treatment means is greater than this calculated value then it is said to be a 'significant difference' or *a difference <u>not</u> due to random chance*. For each set of data, a letter(s) is placed by each treatment mean to show its relationship to every other treatment mean. If two means have one or more letters in common, it is probable that any difference between them is not significant but is the result of random chance. The level of significance that we use is 0.05 ($LSD_{0.05}$). In other words, 95% of the time these treatments are compared this difference will occur. If no letters accompany the means and 'NS' is reported at the top of the column as a footnote marker then no significant difference was found among the means in this group of data.

TURFGRASS CULTIVAR RESEARCH AT THE UNIVERSITY OF ILLINOIS, URBANA, IL

Many years of research are needed to evaluate a turfgrass cultivar before it is placed on the market. For instance, a cultivar that thrives in the Pacific northwest might die during a hot and dry midwest summer. With this in mind, studies were established to evaluate the performance of Kentucky bluegrass, perennial ryegrass, tall fescue, fine fescue, creeping bentgrass, buffalograss, and zoysiagrass cultivars under environmental conditions found in central Illinois.

National Turfgrass Evaluation Program (NTEP) Kentucky Bluegrass Cultivar Trial

J.E. Haley, T.B. Voigt, D.J. Wehner and T.W. Fermanian

Research Protocol:	**Kentucky Bluegrass Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area worked with Ryan dethatcher; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - September 17, 1990; seeding rate - 2 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination.
Plot Maintenance:	mowing height - 1.5 inches; irrigation - to prevent wilt;
1991	pesticides - postemergence broadleaf weed herbicide; fertilization - 1 lb N/M/yr;
1992	pesticides - postemergence broadleaf weed herbicide; fertilization - 3 lb N/M/yr.
1993	pesticides - postemergence broadleaf weed herbicide; fertilization - 3.5 lb N/M/yr.
Experimental Design:	RCB; 3 replications.

Kentucky bluegrass (*Poa pratensis*) is the most widely used turfgrass in Illinois. Its medium to medium fine leaf texture, cold and drought tolerance, ability to form a dense sod, and ability to adapt to a wide range of cultural programs make it suitable for home lawns, parks, athletic fields, golf courses or any area where a medium to high quality turf is desired. The many cultivars of Kentucky bluegrass differ considerably in quality, color, texture, stress tolerance, and resistance to pests. The purpose of this trial is to evaluate the response of 126 Kentucky bluegrass cultivars to the environment found in central Illinois. This cultivar trial is part of a national program (NTEP) conducted at several sites nationwide.

Evaluations of spring greenup, quality and disease performance during 1993 are listed in Table 1. Three Kentucky bluegrass cultivars that exhibited excellent spring greenup were 'Silvia,' 'Ginger' and 'Trenton.' In late April quality ratings for most cultivars were poor to fair. Those cultivars that displayed good or excellent quality in late April were 'Monopoly,' 'Eagleton,' 'Ronde,' 'J-386,' 'PST-A7-1877,' 'Julia,' 'Washington,' 'Ba 73-540,' and 'Barmax.' Turf quality improved in early June and July and remained fair to good throughout August. Reduced performance was primarily the result of dollar spot (*Lanzia* spp. and *Moellerodiscus* spp.) infection in late summer. Turf quality did not improve greatly in September. Cultivars that exhibited good to excellent dollar spot resistance were 'Cultivar 602,' 'Princeton 104,' and 'Eagleton.'

Table 1. The evaluation of Kentucky bluegrass cultivars during the 1993 growing season.[1]

Cultivar	Spring Greenup[2]	Quality[3]						Dollar Spot[4]
	3/30	4/30	6/09	7/08	7/28	8/25	9/30	8/25
A-34	4.7e-g	5.7f-k	5.0c-h	4.7c-g	4.3a-f	3.0a-e	4.7e-i	3.0c-g
Abbey	3.7b-d	3.3a-d	3.7a-d	4.0a-e	4.0a-e	3.0a-e	3.3a-e	3.0c-g
Able 1	4.0c-e	3.3a-d	4.7b-g	5.3e-i	4.0a-e	3.0a-e	5.0f-j	2.3a-e
Alpine	2.7a	3.7a-e	6.7h-j	7.7jk	7.0ij	4.3e-h	4.3d-h	3.3d-h
Ampellia	4.7e-g	5.0d-i	6.0f-j	4.3b-f	4.7b-g	2.7a-d	4.7e-i	2.7b-f
Aspen	5.0f-h	5.0d-i	5.3d-i	4.3b-f	5.3d-i	3.7c-g	5.0f-j	3.7e-i
Ba 69-82	3.7b-d	6.3h-l	6.3g-j	5.7f-i	5.7e-j	3.7c-g	4.0c-g	3.3d-h
Ba 70-131	4.3d-f	5.7f-k	6.3g-j	5.3e-i	5.7e-j	3.3b-f	4.7e-i	3.3d-h
Ba 73-366	3.3a-c	3.3a-d	5.3d-i	4.7c-g	4.3a-f	2.7a-d	3.7b-f	3.0c-g
Ba 73-381	3.7b-d	3.7a-e	4.0a-e	3.7a-d	4.3a-f	4.0d-h	4.3d-h	3.3d-h
Ba 73-382	3.3a-c	2.7ab	3.3a-c	4.7c-g	4.7b-g	2.7a-d	3.7b-f	3.0c-g
Allure (Ba 73-540)	4.0c-e	7.3kl	6.3g-j	5.0d-h	6.0f-j	3.7c-g	4.7e-i	3.0c-g
Ba 74-114	4.0c-e	3.0a-c	3.0ab	3.0ab	2.7a	3.0a-e	2.7a-c	1.0a
Ba 76-305	3.7b-d	4.3b-g	4.0a-e	4.3b-f	5.3d-i	3.7c-g	4.3d-h	3.7e-i
Ba 77-279	2.7a	3.3a-d	3.7a-d	5.0d-h	5.3d-i	3.7c-g	4.3d-h	3.7e-i
Ba 77-292	3.7b-d	3.0a-c	3.7a-d	3.3a-c	3.3a-c	2.3a-c	3.3a-e	2.3a-e
Ba 77-700	3.7b-d	3.3a-d	3.0ab	4.7c-g	4.7b-g	4.0d-h	4.0c-g	4.3g-k
Ba 78-258	3.7b-d	4.0a-f	4.3b-f	5.3e-i	6.0f-j	3.3b-f	4.7e-i	2.7b-f
Banff	6.3jk	5.0d-i	4.7b-g	3.3a-c	4.0a-e	3.3b-f	3.7b-f	3.3d-h
BAR VB 1169	4.3d-f	4.7c-h	5.7e-i	4.0a-e	3.0ab	2.3a-c	4.7e-i	1.7a-c
BAR VB 1184	3.7b-d	4.7c-h	5.7e-i	5.0d-h	3.3a-c	2.3a-c	3.7b-f	1.3ab
BAR VB 7037	3.0ab	4.3b-g	4.7b-g	4.7c-g	5.0c-h	3.7c-g	4.0c-g	3.0c-g
BAR VB 895	6.3jk	4.7c-h	6.0f-j	4.0a-e	4.3a-f	3.3b-f	4.0c-g	3.0c-g
Barblue	5.7h-j	5.0d-i	5.7e-i	4.0a-e	5.0c-h	3.7c-g	3.7b-f	4.0f-j
Barmax	4.0c-e	7.7l	6.0f-j	5.3e-i	5.7e-j	4.0d-h	4.7e-i	3.3d-h
Baron	3.7b-d	3.3a-d	4.3b-f	4.7c-g	4.3a-f	4.0d-h	3.7b-f	4.0f-j
Barsweet	3.7b-d	3.7a-e	6.7h-j	4.7c-g	3.7a-d	2.0ab	3.3a-e	2.0a-d
Bartitia	4.3d-f	3.3a-d	5.3d-i	5.7f-i	5.0c-h	3.3b-f	3.7b-f	2.3a-e
Barzan	5.0f-h	3.7a-e	5.7e-i	6.7ij	5.3d-i	4.0d-h	4.0c-g	3.3d-h
Blacksburg	4.0c-e	4.0a-f	5.7e-i	6.0g-i	6.3g-j	4.3e-h	5.7h-l	4.3g-k
Broadway	3.3a-c	4.0a-f	6.7h-j	6.7ij	3.7a-d	2.3a-c	3.3a-e	1.7a-c
Cardiff	5.0f-h	5.7f-k	4.7b-g	3.7a-d	4.0a-e	3.3b-f	3.3a-e	3.0c-g

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a 1-9 scale where 9 = green, actively growing turf and 1 = dormant turf.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

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Table 1. The evaluation of Kentucky bluegrass cultivars during the 1993 growing season.[1] *(continued)*

Cultivar	Spring Greenup[2]	Quality[3]						Dollar Spot[4]
	3/30	4/30	6/09	7/08	7/28	8/25	9/30	8/25
Challenger	4.3d-f	4.0a-f	3.3a-c	3.0ab	3.7a-d	2.7a-d	2.7a-c	3.0c-g
Chelsea	3.3a-c	3.3a-d	4.0a-e	4.3b-f	3.0ab	3.0a-e	3.0a-d	2.7b-f
Classic	5.7h-j	5.3e-j	5.7e-i	4.7c-g	4.7b-g	3.7c-g	4.7e-i	3.3d-h
Cobalt	5.0f-h	4.7c-h	5.7e-i	4.3b-f	3.7a-d	3.3b-f	4.0c-g	3.3d-h
Conni	3.3a-c	4.3b-g	5.7e-i	4.7c-g	3.3a-c	2.0ab	3.3a-e	1.3ab
Coventry	4.3d-f	6.0g-l	6.0f-j	5.7f-i	6.7h-j	3.7c-g	4.7e-i	3.3d-h
Crest	3.0ab	3.0a-d	3.0ab	3.7a-d	4.0a-e	3.3b-f	3.3a-e	3.7e-i
Cultivar 1757	4.7e-g	5.0d-i	4.3b-f	3.7a-d	3.7a-d	4.0d-h	3.3a-e	4.3g-k
Cultivar 602	4.0c-e	5.3e-j	7.0ij	5.3e-i	6.3g-j	5.3hi	6.7kl	5.3j-l
Cultivar 798	4.0c-e	5.0d-i	4.7b-g	3.7a-d	3.7a-d	4.0d-h	3.3a-e	3.7e-i
Cynthia	5.3g-i	6.0g-l	6.7h-j	4.7c-g	5.3d-i	4.7f-h	4.3d-h	4.0f-j
Dawn	6.0i-k	5.3e-j	6.3g-j	3.7a-d	4.0a-e	3.3b-f	3.3a-e	3.3d-h
Destiny	5.0f-h	4.3b-g	4.0a-e	4.0a-e	3.3a-c	3.7c-g	3.3a-e	3.3d-h
Donna	3.7b-d	4.0a-f	5.3d-i	4.0a-e	4.3a-f	3.7c-g	3.0a-d	3.3d-h
Eagleton	4.7e-g	6.7i-l	5.7e-i	5.3e-i	6.3g-j	6.3i	6.7kl	5.7kl
Eclipse	5.0f-h	5.3e-j	5.3d-i	4.0a-e	6.0f-j	5.0g-i	4.3d-h	4.7h-k
Estate	4.7e-g	5.3e-j	5.7e-i	4.7c-g	5.0c-h	3.7c-g	3.7b-f	3.0c-g
EVB 13.703	4.3d-f	5.3e-j	5.3d-i	4.7c-g	5.3d-i	4.0d-h	3.7b-f	4.3g-k
EVB 13.863	3.0ab	3.7a-e	5.3d-i	4.0a-e	3.0ab	3.7c-g	3.7b-f	3.3d-h
Fortuna	3.3a-c	4.0a-f	3.3a-c	4.7c-g	4.3a-f	3.3b-f	4.0c-g	2.7b-f
Freedom	5.7h-j	5.3e-j	5.0c-h	3.7a-d	4.0a-e	3.3b-f	3.3a-e	3.3d-h
Gemar	6.0i-k	6.0g-l	4.3b-f	3.7a-d	4.7b-g	4.3e-h	4.3d-h	3.7e-i
Georgetown	5.7h-j	5.0d-i	5.7e-i	3.7a-d	3.7a-d	3.7c-g	4.3d-h	3.3d-h
Ginger	7.3l	3.0a-d	2.3a	3.0ab	3.3a-c	3.0a-e	2.3ab	3.3d-h
Glade	4.0c-e	5.3e-j	5.7e-i	5.3e-i	6.0f-j	4.0d-h	4.7e-i	3.7e-i
Gnome	3.0ab	3.3a-d	3.3a-c	4.0a-e	4.0a-e	3.0a-e	3.7b-f	2.3a-e
Greenley	4.7e-g	6.0g-l	3.3a-c	3.7a-d	4.7b-g	3.0a-e	3.0a-d	3.3d-h
Shamrock (H86-712)	5.0f-h	5.7f-k	6.3g-j	6.3h-j	6.3g-j	5.3hi	6.0i-l	5.0i-k
Haga	6.3jk	4.7c-h	5.7e-i	3.3a-c	3.7a-d	3.7c-g	4.3d-h	3.3d-h
HV 125	4.3d-f	3.0a-d	5.3d-i	3.3a-c	3.3a-c	3.7c-g	3.3a-e	3.3d-h
Indigo	4.3d-f	3.7a-e	4.0a-e	2.7a	3.0ab	3.0a-e	3.0a-d	3.3d-h
J-229	4.3d-f	5.3e-j	6.3g-j	5.3e-i	5.3d-i	4.7f-h	4.7e-i	4.0f-j

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a 1-9 scale where 9 = green, actively growing turf and 1 = dormant turf.

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Table 1. The evaluation of Kentucky bluegrass cultivars during the 1993 growing season.[1] *(continued)*

Cultivar	Spring Greenup[2]	Quality[3]						Dollar Spot[4]
	3/30	4/30	6/09	7/08	7/28	8/25	9/30	8/25
J-333	4.0c-e	5.0d-i	7.0ij	5.3e-i	5.3d-i	3.3b-f	4.3d-h	3.7e-i
J-335	4.0c-e	6.0g-l	7.0ij	5.7f-i	5.3d-i	4.0d-h	5.3g-k	4.3g-k
J-386	5.0f-h	7.0j-l	4.7b-g	4.7c-g	4.7b-g	4.0d-h	4.7e-i	3.3d-h
J11-94	5.7h-j	5.7f-k	5.7e-i	4.3b-f	4.0a-e	3.3b-f	3.3a-e	3.0c-g
J13-152	5.7h-j	6.0g-l	5.3d-i	3.3a-c	3.7a-d	3.7c-g	3.3a-e	4.0f-j
J34-99	4.7e-g	5.0d-i	5.7e-i	4.0a-e	3.7a-d	3.3b-f	3.7b-f	3.7e-i
Julia	4.0c-e	7.0j-l	6.0f-j	5.0d-h	4.7b-g	3.0a-e	3.3a-e	3.0c-g
Kelly	3.3a-c	4.3b-g	4.7b-g	4.7c-g	4.3a-f	3.0a-e	4.7e-i	2.7b-f
Kenblue	4.3d-f	5.0d-i	4.3b-f	4.0a-e	4.3a-f	3.3b-f	4.3d-h	3.7e-i
KWS Pp 13-2	4.0c-e	4.0a-f	4.0a-e	4.3b-f	3.0ab	3.0a-e	3.3a-e	3.3d-h
Liberty	6.0i-k	4.3b-g	5.3d-i	4.3b-f	4.7b-g	4.7f-h	3.7b-f	4.7h-k
Limousine	3.3a-c	5.3e-j	7.7j	6.7ij	5.3d-i	3.7c-g	5.0f-j	3.0c-g
Livingston	4.7e-g	5.3e-j	4.7b-g	4.0a-e	5.0c-h	4.0d-h	4.7e-i	3.3d-h
Marquis	3.3a-c	2.7ab	3.7a-d	4.0a-e	4.3a-f	3.7c-g	3.7b-f	4.0f-j
Melba	5.0f-h	4.0a-f	5.7e-i	6.0g-i	4.7b-g	3.0a-e	4.0c-g	2.7b-f
Merion	3.3a-c	3.0a-c	3.7a-d	3.0ab	3.0ab	2.7a-d	3.0a-d	3.0c-g
Merit	3.3a-c	4.0a-f	4.0a-e	5.3e-i	6.0f-j	4.0d-h	4.3d-h	3.7e-i
Midnight	4.0c-e	3.7a-e	4.7b-g	4.3b-f	5.3d-i	3.7c-g	4.3d-h	4.0f-j
Minstrel	4.3d-f	3.0a-c	4.7b-g	5.0d-h	4.3a-f	3.3b-f	4.0c-g	3.0c-g
Miracle	4.0c-e	4.0a-f	4.3b-f	4.0a-e	2.7aa	2.3a-c	2.3ab	2.0a-d
Miranda	3.0ab	4.0a-f	5.0c-h	4.3b-f	3.7a-d	3.3b-f	3.0a-d	2.7b-f
Monopoly	3.0ab	6.7i-l	6.0f-j	6.3h-j	5.3d-i	5.0g-i	5.0f-j	4.0f-j
Nassau	6.0i-k	2.7ab	3.0ab	3.0ab	3.3a-c	3.3b-f	2.7a-c	3.3d-h
NE 80-47	4.0c-e	4.0a-f	3.0ab	3.3a-c	3.7a-d	2.7a-d	3.0a-d	2.7b-f
Noblesse	4.3d-f	4.0a-f	4.0a-e	3.7a-d	3.3a-d	3.3b-f	3.0a-d	3.7e-i
NuStar	3.3a-c	5.0d-i	6.7h-j	5.3e-i	4.3a-f	4.0d-h	4.0c-g	4.3g-k
Opal	3.3a-c	3.7a-e	4.3b-f	4.0a-e	3.3a-d	1.7a	4.0c-g	1.7a-c
Platini	4.0c-e	6.3h-l	6.7h-j	4.7c-g	4.3a-f	2.7a-d	4.3d-h	2.7b-f
PR-1	4.3d-f	6.0g-l	6.3g-j	3.7a-d	4.0a-e	3.0a-e	3.7b-f	2.7b-f
Princeton 104	3.7b-d	6.0g-l	7.7j	6.7ij	7.3j	6.3i	6.7kl	6.7l
PST-0514	3.3a-c	3.7a-e	4.7b-g	6.0g-i	4.7b-g	3.0a-e	4.7e-i	2.7b-f

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a 1-9 scale where 9 = green, actively growing turf and 1 = dormant turf.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[4] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

Table 1. The evaluation of Kentucky bluegrass cultivars during the 1993 growing season.[1] *(continued)*

Cultivar	Spring Greenup[2]	Quality[3]						Dollar Spot[4]
	3/30	4/30	6/09	7/08	7/28	8/25	9/30	8/25
PST-1DW	3.0ab	3.3a-d	7.7j	7.7jk	5.3d-i	3.0a-e	7.0l	2.3a-e
PST-A7-1877	3.7b-d	7.0j-l	6.0f-j	5.0d-h	5.3d-i	4.3e-h	4.3d-h	3.3d-h
PST-A7-341	3.0ab	2.7ab	3.7a-d	3.3a-c	4.0a-e	3.3b-f	3.3a-e	3.0c-g
PST-A84-405	4.3d-f	4.3b-g	4.7b-g	4.0a-e	4.3a-f	4.0d-h	4.0c-g	3.3d-h
PST-A84-803	5.0f-h	5.0d-i	4.0a-e	3.7a-d	5.0c-h	3.0a-e	3.7b-f	2.7b-f
PST-A84-928	3.7b-d	3.3a-d	3.7a-d	4.3b-f	4.3a-f	3.7c-g	3.0a-d	3.3d-h
PST-B8-106	3.7b-d	5.7f-k	6.3g-j	5.3e-i	5.0c-h	3.3b-f	5.3g-k	3.0c-g
PST-B8-13	3.3a-c	2.3a	3.0ab	3.7a-d	4.7b-g	3.7c-g	3.0a-d	3.7e-i
PST-C-224	4.3d-f	5.0d-i	5.3d-i	5.3e-i	6.0f-j	3.7c-g	3.7b-f	3.7e-i
PST-C-76	3.7b-d	4.0a-f	4.7b-g	4.3b-f	5.3d-i	3.7c-g	5.3g-k	3.3d-h
PST-HV-116	4.3d-f	3.7a-e	5.0c-h	4.0a-e	4.0a-e	3.0a-e	3.7b-f	2.3a-e
PST-R-740	3.3a-c	3.3a-d	4.7b-g	4.0a-e	4.0a-e	3.0a-e	2.7a-c	1.7a-c
PST-RE-88	3.3a-c	4.3b-g	4.3b-f	4.7c-g	4.7b-g	3.3b-f	4.3d-h	3.3d-h
PST-UD-10	4.7e-g	5.3e-j	4.3b-f	4.7c-g	5.3d-i	4.3e-h	5.3g-k	4.3g-k
PST-UD-12	5.7h-j	4.7c-h	5.7e-i	3.3a-c	4.3a-f	3.3b-f	3.7b-f	3.3d-h
PSU-151	5.7h-j	6.3h-l	7.0ij	5.3e-i	6.3g-j	4.7f-h	5.3g-k	4.3g-k
R751A	3.7b-d	3.7a-e	4.7b-g	4.0a-e	5.0c-h	3.7c-g	3.3a-e	3.3d-h
Ram-1	4.7e-g	5.7f-k	5.7e-i	4.3b-f	2.7a	1.7a	3.0a-d	1.0a
Ronde	5.3g-i	6.7i-l	5.3d-i	5.0d-h	5.0c-h	3.7c-g	3.3a-e	3.3d-h
Silvia	6.7kl	4.7c-h	4.7b-g	4.0a-e	3.3a-c	2.3a-c	3.3a-e	2.7b-f
South Dakota	5.3g-i	5.7f-k	4.0a-e	3.3a-c	3.0ab	2.3a-c	3.3a-e	2.0a-d
SR 2000	3.7b-d	6.3h-l	5.3d-i	4.7c-g	5.7e-j	5.3hi	5.3g-k	4.7h-k
SR 2100	4.0c-e	5.0d-i	6.0f-j	5.7f-i	5.0c-h	4.0d-h	5.7h-l	3.7e-i
Suffolk	6.3jk	4.7c-h	6.3g-j	3.0ab	4.0a-e	3.7c-g	4.0c-g	3.3d-h
Summit	3.0ab	4.7c-h	7.7j	8.3k	6.7h-j	3.3b-f	6.3j-l	3.0c-g
Touchdown	4.3d-f	6.3h-l	5.0c-h	5.0d-h	3.7a-d	3.0a-e	4.0c-g	3.0c-g
Trampas	3.3a-c	4.0a-f	6.7h-j	5.3e-i	4.0a-e	3.3b-f	4.0c-g	2.7
Trenton	7.3l	6.0g-l	5.0c-h	4.3b-f	4.3a-f	4.7f-h	4.3d-h	4.0f-j
Washington	5.3g-i	7.3kl	6.3g-j	5.7f-i	5.7e-j	4.0d-h	5.0f-j	4.3g-k
WW Ag 505	4.3d-f	4.7c-h	7.0ij	5.3e-i	5.3d-i	3.7c-g	4.3d-h	4.0f-j
WW Ag 508	3.3a-c	4.3b-g	6.7h-j	6.3h-j	3.3a-c	1.7a	2.0a	1.3ab

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a 1-9 scale where 9 = green, actively growing turf and 1 = dormant turf.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[4] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

Kentucky Bluegrass Maintained at a 0.75 Inch Mowing Height

J.E. Haley

Research Protocol:	**Kentucky Bluegrass Maintained at a 0.75 Inch Mowing Height**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area rototilled; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - September 13, 1988; seeding rate - 2 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination.
Plot Maintenance:	irrigation - to prevent wilt.
1989	mowing height - 2 inches; fertilization - 3 lbs N/M/yr; pesticides - pre & postemergence crabgrass herbicide, Prograss at 0.75 lb ai/A (10/10/89 and 11/13/89).
1990	mowing height - 2 inches; fertilization - 3 lbs N/M/yr; pesticides - preemergence crabgrass herbicide.
1991	mowing height - 1.5 inches; fertilization - 1 lb N/M/yr; pesticides - pre & postemergence crab grass herbicide.
1992	mowing height - 0.75 inches; fertilization - 3 lbs N/M/yr; pesticides - postemergence broadleaf weed herbicide.
1993	mowing height - 0.75 inches; fertilization - 1 lbs N/M/yr (through July); pesticides - postemergence broadleaf weed herbicide.
Experimental Design:	RCB; 3 replications.

Kentucky bluegrass (*P. pratensis*) is often mowed at heights as low as 0.75 for use on golf course fairways. Cultivars that perform well at a 2 or 3 inch mowing height may not perform as well when maintained at 1 inch or lower. This trial was established to evaluate Kentucky bluegrass cultivar quality when maintained at a 0.75 inch height of cut.

During the spring of 1992, fifty four mature Kentucky bluegrass cultivars that had been previously maintained at 2 inches were gradually lowered in mowing height to 0.75 inch. Heavy rainfall during 1992 and 1993 frequently flooded the site. Plots on the north end of the evaluation were sometimes covered with water for a period of several days. Water saturated soil could not support the mowing equipment, so it was difficult to maintain the 0.75 cutting height. Annual bluegrass (*Poa annua*) germination was favored by high soil moisture. Annual bluegrass infestation was evaluated in April 1993 (Table 2). It is expressed as the percent area of the plot covered with annual bluegrass. Turfgrass cultivars that had 10% or less annual bluegrass invasion were 'Mystic,' 'Tendos,' 'Midnight,' 'Wabash,' and 'Somerset.'

During 1993, disease incidence was high (Table 2). Brown patch (*Rhizoctonia* spp.) and dollar spot (*Lanzia* spp. and *Moellerodiscus* spp.) were a problem throughout

the summer. Most of the cultivars showed fair to good resistance to brown patch with the exception of 'Baron.' Dollar spot was a problem for all of the cultivars. Quality was poor to fair for all the cultivars under this management. To improve quality it would be necessary to correct water drainage and fertilize more frequently. Due to extensive deterioration of all the cultivars in this evaluation the trial was not continued beyond July 1993.

Table 2. The evaluation of Kentucky bluegrass cultivars mowed at 0.75 inch in height during the 1993 growing season.[1]

Cultivar	Quality[2] 5/27	6/25	7/27[ns]	% Annual Bluegrass[3] 4/23	Dollar Spot[4] 7/27	Brown Patch[4] 7/27[ns]
Abbey	4.3c-g	2.3a-c	3.3	28.3a-j	3.7a-d	9.0
Abel 1	6.0h	5.0f-h	4.3	15.0a-e	5.3c-g	7.7
Adelphi	5.0e-h	2.7a-d	3.0	38.3e-k	3.0ab	9.0
Alpine	5.3f-h	5.0f-h	3.7	15.0a-e	3.7a-d	7.3
Amazon	3.3a-d	2.7a-d	2.7	50.0i-l	3.7a-d	6.7
America	4.3c-g	2.7a-d	3.0	40.0f-k	3.7a-d	8.3
Aspen	5.0e-h	4.0d-f	3.7	20.0a-f	5.3c-g	7.3
Ba 70-242	4.3c-g	2.3a-c	3.3	36.7d-k	4.0a-e	6.7
Baron	3.0a-c	2.0ab	3.0	36.7d-k	5.0b-g	4.3
Bel 21	3.7a-e	1.7a	3.3	43.3f-k	3.3a-c	8.0
Blacksburg	4.0b-f	3.3b-e	3.3	11.7a-c	4.3a-f	6.7
Bristol	4.0b-f	2.7a-d	2.7	51.7j-l	2.7a	9.0
Bronco	5.0e-h	3.7c-f	3.7	13.3a-d	5.3c-g	9.0
CB1	4.7d-h	3.0a-e	3.0	31.7b-j	3.3a-c	8.3
Challenger	5.3f-h	3.0a-e	3.3	31.7b-j	3.7a-d	6.7
Chateau	4.7d-h	3.7c-f	3.7	38.3e-k	4.7a-g	7.3
Cheri	4.7d-h	3.3b-e	3.3	25.0a-h	4.0a-e	6.7
Classic	4.0b-f	2.3a-c	3.0	48.3h-l	4.0a-e	7.0
Compact	3.3a-d	3.0a-e	3.0	43.3f-k	4.3a-f	7.3
Coventry	4.0b-f	3.0a-e	3.0	31.7b-j	3.3a-c	7.3
Cultivar 229	5.0e-h	3.0a-e	3.0	28.3a-j	3.7a-d	7.3
Cultivar 84-403	4.0b-f	3.0a-e	3.0	28.3a-j	4.7a-g	8.0
Dawn	4.7d-h	3.0a-e	3.3	46.7g-l	4.7a-g	6.7
Destiny	5.0e-h	3.0a-e	3.3	35.0c-j	3.7a-d	9.0
Eclipse	4.7d-h	2.7a-d	3.3	41.7f-k	4.3a-f	8.0
Estate	4.0b-f	3.7c-f	2.7	28.3a-j	4.3a-f	7.0

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[3] Percent annual bluegrass evaluations are a visual estimate of percent of the plot covered with annual bluegrass plants.

[4] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

[ns] No significant difference was found among the means in this group of data.

Table 2. The evaluation of Kentucky bluegrass cultivars mowed at 0.75 inch in height during the 1993 growing season.[1] *(continued)*

Cultivar	Quality[2] 5/27	Quality[2] 6/25	Quality[2] 7/27[ns]	Annual Bluegrass[3] 4/23	Dollar Spot[4] 7/27	Brown Patch[4] 7/27[ns]
Freedom	6.0h	3.3b-e	3.0	21.7a-f	3.3a-c	9.0
Fylking	3.3a-d	1.7a	3.0	60.0k-m	3.7a-d	9.0
Georgetown	3.3a-d	2.0ab	2.7	70.0lm	3.7a-d	7.7
Glade	4.7d-h	5.0f-h	3.3	11.7a-c	6.7g	7.7
Gnome	4.7d-h	1.7a	3.0	36.7d-k	3.0ab	9.0
H76-1034	4.0b-f	2.3a-c	3.3	40.0f-k	4.3a-f	8.3
Haga	5.3f-h	3.3b-e	3.7	28.3a-j	5.0b-g	7.7
Huntsville	3.3a-d	2.7a-d	2.7	41.0f-k	2.7a	9.0
Ikone	4.0b-f	4.0d-f	3.7	25.0a-h	4.7a-g	7.7
Julia	2.7ab	2.0ab	2.3	40.0f-k	4.0a-e	7.0
Liberty	4.7d-h	2.0ab	3.0	36.7f-k	3.3a-c	8.3
Loft's 1757	4.0b-f	2.0ab	3.3	28.3a-j	4.7a-g	7.3
Merit	4.3c-g	2.7a-d	3.0	28.3a-j	5.3c-g	8.7
Midnight	5.3f-h	5.7gh	4.7	8.3ab	5.7d-g	8.3
Monopoly	4.3c-g	3.0a-e	3.3	15.0a-e	3.7a-d	8.3
Mystic	6.0h	6.0h	4.0	6.0a	3.7a-d	9.0
Nassau	5.0e-h	1.7a	2.7	76.7m	2.7a	9.0
Nutop	3.0a-c	3.3b-e	3.3	21.7a-f	5.0b-g	8.0
Opal	3.3a-d	2.3a-c	3.0	43.3f-k	4.3a-f	7.3
Ram I	3.0a-c	2.3a-c	2.7	23.3a-g	4.3a-f	7.0
S-21	3.0a-c	2.3a-c	2.7	20.0a-f	6.0e-g	9.0
Somerset	5.7gh	4.3e-g	4.0	10.0ab	4.0a-e	9.0
Suffolk	4.7d-h	3.0a-e	2.7	50.0i-l	3.7a-d	8.3
Sydsport	5.3f-h	4.0d-f	3.7	23.3a-g	4.3a-f	8.0
Tendos	5.3f-h	5.0f-h	4.3	8.3ab	6.3fg	8.3
Trenton	4.0b-f	2.7a-d	3.3	43.3f-k	4.7a-g	9.0
Victa	4.3c-g	3.0a-e	3.0	26.7a-i	3.7a-d	9.0
Wabash	2.3a	2.7a-d	3.3	8.7ab	4.3a-f	8.3

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[3] Percent annual bluegrass evaluations are a visual estimate of percent of the plot covered with annual bluegrass plants.

[4] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

[ns] No significant difference was found among the means in this group of data.

NTEP Perennial Ryegrass Cultivar Trial

J.E. Haley, T.B. Voigt, D.J. Wehner and T.W. Fermanian

Research Protocol:	**Perennial Ryegrass Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area worked with Ryan dethatcher; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - September 13, 1990; seeding rate - 4 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination.
Plot Maintenance:	mowing height - 1.5 inches; irrigation - to prevent wilt.
1991	pesticides - postemergence broadleaf weed herbicide; fertilization - 1 lb N/M/yr.
1992	pesticides - postemergence broadleaf weed herbicide; fertilization - 3 lb N/M/yr.
1993	pesticides - postemergence broadleaf weed herbicide; fertilization - 3.5 lb N/M/yr.
Experimental Design:	RCB; 3 replications.

Perennial ryegrass (*Lolium perenne* Linnaeus) is included in seed mixtures as a temporary lawn or nursegrass, however it can persist for a number of years. In central Illinois it is used on many golf course fairways and is overseeded annually. It is also used tin athletic fields with Kentucky bluegrass. In Illinois, deterioration of turf during summer months has prevented perennial ryegrass from becoming an important permanent turfgrass. Improved cultivars with better color, density, mowing quality, and disease resistance have challenged the traditional image of perennial ryegrass. The turf program at the University of Illinois is participating in a NTEP perennial ryegrass trial. This nationwide test evaluates the performance of perennial ryegrass cultivars under a broad range of climatic and cultural conditions.

During 1993, spring quality ranged from fair to excellent for all of the perennial ryegrass cultivars (Table 3). Ryegrass quality steadily declined from June throughout August. Although rainfall was plentiful, temperatures were high for most of the summer. Quality improved in September and by October all perennial ryegrass cultivars displayed at least fair quality with many in the good to excellent range.

Table 3. The evaluation of perennial ryegrass during the 1993 growing season.[1]

Cultivar	Quality[2] 5/14	6/23	7/23	8/26	9/29	10/21
Accolade	5.7a-c	4.3a-c	3.3a-c	3.0ab	5.3a-e	5.3a-d
Advent	6.7c-f	5.7d-g	5.0d-f	4.3c-f	7.3f-h	6.3b-g
Allegro	6.3b-e	5.0b-e	3.3a-c	3.0ab	5.3a-e	5.7a-e
Assure	6.3b-e	5.3c-f	3.3a-c	3.7a-d	5.0a-d	5.3a-d
BAR Lp 852	6.3b-e	4.7a-d	3.7a-d	2.7a	5.3a-e	5.3a-d
Barrage++	7.3e-g	6.7g	4.3b-f	4.7d-g	7.3f-h	7.0d-g
Caliente	6.7c-f	5.0b-e	5.0d-f	4.3c-f	6.3c-h	6.0a-f
Calypso	8.0g	5.7d-g	4.0a-e	3.7a-d	5.0a-d	6.0a-f
Cartel	6.7c-f	5.3c-f	3.3a-c	3.0ab	5.3a-e	5.0a-c
Commander	6.0a-d	5.0b-e	3.3a-c	3.3a-c	6.0b-g	5.3a-d
Danaro	5.0a	4.7a-d	3.3a-c	3.0ab	5.7a-f	5.3a-d
Dandy	7.0d-g	5.0b-e	4.7c-f	5.0e-g	7.0e-h	6.3b-g
Danilo	7.0d-g	4.7a-d	4.3b-f	3.3a-c	5.3a-e	5.7a-e
EEG 358	5.7a-c	5.0b-e	3.3a-c	3.0ab	6.7d-h	6.0a-f
Equal	6.7c-f	5.7d-g	3.7a-d	4.0b-e	6.3c-h	6.3b-g
Legacy	6.7c-f	5.0b-e	3.3a-c	3.3a-c	4.7a-c	5.0a-c
Meteor	5.3ab	4.0ab	2.7a	3.0ab	4.0a	6.0a-f
Mom Lp 3147	7.0d-g	5.0b-e	4.3b-f	3.7a-d	6.0b-g	6.7c-g
Mom Lp 3184	6.3b-e	5.3c-f	4.0a-e	3.7a-d	5.7a-f	5.7a-e
OFI-D4	6.7c-f	5.0b-e	2.7a	2.7a	6.0b-g	5.7a-e
OFI-F7	6.7c-f	4.7a-d	4.0a-e	4.0b-e	6.7d-h	6.3b-g
Poly-SH	5.3ab	5.0b-e	3.3a-c	3.3a-c	6.0b-g	6.0a-f
PR 9121	6.7c-f	5.0b-e	3.0ab	3.0ab	5.7a-f	4.7ab
PST-2FQR	6.0a-d	5.3c-f	3.0ab	4.0b-e	6.0b-g	6.7c-g
PST-2OG	7.0d-g	5.0b-e	4.0a-e	3.0ab	6.3c-h	7.3e-g
Riviera	6.7c-f	5.0b-e	3.7a-d	3.3a-c	6.0b-g	6.7c-g
Saturn	6.3b-e	5.0b-e	3.0ab	3.7a-d	6.7d-h	6.7c-g
Seville	8.0g	5.0b-e	4.7c-f	5.3fg	8.0h	8.0g
SR 4200	8.0g	5.7d-g	4.3b-f	4.3c-f	8.0h	7.7fg
Syn-P	6.7c-f	5.0b-e	4.0a-e	4.0b-e	5.0a-d	6.0a-f
Taya	6.0a-d	5.3c-f	3.0ab	3.0ab	5.3a-e	5.0a-c
WVPB-88-PR-C-23	7.0d-g	5.7d-g	3.3a-c	2.7a	5.7a-f	6.3b-g
ZW 42-176	6.3b-e	5.3c-f	3.0ab	3.0ab	5.3a-e	4.7ab

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

Table 3. The evaluation of perennial ryegrass during the 1993 growing season.[1] *(continued)*

Cultivar	Quality[2] 5/14	6/23	7/23	8/26	9/29	10/21
4DD-Delaware Dwarf	6.7c-f	5.3c-f	4.0a-e	3.7a-d	6.7d-h	7.7fg
BAR Lp 086FL	6.7c-f	5.0b-e	4.7c-f	3.7a-d	6.3c-h	7.0d-g
Charger	6.0a-d	5.0b-e	4.0a-e	3.0ab	4.7a-c	6.3b-g
CLP 144	5.3ab	4.3a-c	3.0ab	2.7a	4.7a-c	5.3a-d
Cutless	6.7c-f	4.7a-d	3.0ab	3.0ab	6.0b-g	5.7a-e
Entrar	6.0a-d	5.3c-f	3.3a-c	3.3a-c	6.3c-h	7.0d-g
Envy	7.0d-g	4.3a-c	4.0a-e	3.3a-c	6.7d-h	6.3b-g
Express	6.7c-f	6.0e-g	4.3b-f	4.0b-e	6.7d-h	7.7fg
GEN-90	7.3e-g	5.0b-e	4.3b-f	3.7a-d	6.3c-h	7.0d-g
Gettysburg	7.0d-g	6.0e-g	3.7a-d	4.7d-g	7.0e-h	6.3b-g
Koos 90-1	7.7fg	5.3c-f	3.7a-d	3.7a-d	6.0b-g	6.7c-g
Koos 90-2	7.0d-g	4.7a-d	3.3a-c	3.3a-c	5.7a-f	5.7a-e
Mom Lp 3111	5.3ab	5.3c-f	3.0ab	3.0ab	5.3a-e	5.3a-d
NK 89001	5.7a-c	5.7d-g	5.0d-f	4.0b-e	6.7d-h	6.3b-g
Ovation	6.3b-e	5.7d-g	3.7a-d	3.7a-d	5.0a-d	5.7a-e
P89	7.3e-g	5.3c-f	4.0a-e	4.7d-g	7.3f-h	7.0d-g
Pebble Beach	6.0a-d	4.3a-c	2.7a	2.7a	4.3ab	4.3a
Pick 1800	7.7fg	5.0b-e	4.0a-e	4.7d-g	7.7gh	8.0g
Pick 9100	7.0d-g	4.7a-d	4.0a-e	3.7a-d	6.7d-h	7.0d-g
Pick DKM	6.7c-f	4.7a-d	5.7f	3.7a-d	6.7d-h	7.3e-g
Pleasure	6.3b-e	4.7a-d	4.3b-f	3.7a-d	6.0b-g	6.0a-f
PST-290	8.0g	4.7a-d	3.3a-c	4.0b-e	5.7a-f	6.7c-g
PST-2DPR	7.7fg	5.7d-g	4.3b-f	3.3a-c	6.7d-h	7.7fg
PST-GH-89	6.7c-f	5.3c-f	3.7a-d	3.3a-c	6.0b-g	6.3b-g
Sherwood	6.7c-f	4.7a-d	3.3a-c	3.3a-c	6.3c-h	6.7c-g
Shining Star (PST-2B3)	7.3e-g	5.3c-f	4.7c-f	3.3a-c	7.0e-h	6.7c-g
Surprise	6.3b-e	5.7d-g	3.7a-d	3.3a-c	5.7a-f	6.3b-g
Target	7.7fg	5.7d-g	4.0a-e	4.3c-f	6.3c-h	6.3b-g
Troubadour	6.0a-d	3.7a	3.7a-d	3.0ab	5.3a-e	5.7a-e
WVPB 89-92	6.7c-f	5.0b-e	3.0ab	3.0ab	5.7a-f	5.0a-c
WVPB-89-87A	7.0d-g	5.0b-e	3.7a-d	3.3a-c	6.0b-g	5.3a-d
WVPB-89-PR-A-3	6.7c-f	5.3c-f	4.0a-e	3.0ab	5.3a-e	7.0d-g
ZPS-28D	7.7fg	5.3c-f	4.3b-f	4.0b-e	7.0e-h	8.0g

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

Table 3. The evaluation of perennial ryegrass during the 1993 growing season.[1] *(continued).*

Cultivar	Quality[2]					
	5/14	6/23	7/23	8/26	9/29	10/21
2P2-90	7.7fg	5.0b-e	3.3a-c	4.0b-e	7.7gh	6.7c-g
89-666	6.7c-f	4.7a-d	4.3b-f	5.3fg	7.0e-h	6.3b-g
APM	8.0g	6.0e-g	5.0d-f	5.7g	6.7d-h	6.3b-g
C-21	6.0a-d	4.3a-c	4.3b-f	4.3c-f	6.3c-h	6.7c-g
Competitor	7.0d-g	4.3a-c	3.0ab	3.3a-c	5.7a-f	7.3e-g
Cultivar 856	5.7a-c	4.7a-d	4.0a-e	4.0b-e	7.0e-h	6.7c-g
Derby Supreme	6.3b-e	4.0ab	3.0ab	3.0ab	5.7a-f	6.0a-f
Dimension (2H7)	6.3b-e	4.7a-d	3.0ab	3.0ab	7.0e-h	6.7c-g
Duet	5.7a-c	4.0ab	3.3a-c	3.0ab	6.7d-h	7.7fg
Fiesta II	6.3b-e	5.3c-f	3.0ab	2.7a	5.3a-e	5.3a-d
HE 311	6.0a-d	5.0b-e	3.7a-d	3.7a-d	6.7d-h	6.0a-f
Lindsay	5.7a-c	6.3fg	3.7a-d	3.3a-c	5.3a-e	5.3a-d
Mom Lp 3182	6.0a-d	6.3fg	5.0d-f	4.0b-e	6.7d-h	6.7c-g
MVF 89-88	6.0a-d	4.7a-d	3.7a-d	3.7a-d	5.0a-d	5.3a-d
MVF 89-90	7.0d-g	5.3c-f	4.3b-f	3.3a-c	6.3c-h	7.0d-g
N-33	6.7c-f	5.0b-e	3.7a-d	3.7a-d	5.7a-f	5.7a-e
Nomad	6.3b-e	5.0b-e	3.3a-c	3.0ab	5.7a-f	6.0a-f
Patriot II	6.7c-f	5.7d-g	4.0a-e	3.3a-c	6.0b-g	6.3b-g
Pick 89-4	7.0d-g	4.0ab	3.7a-d	4.3c-f	7.3f-h	7.7fg
Pick EEC	6.7c-f	5.0b-e	3.7a-d	4.0b-e	7.3f-h	7.0d-g
Pinnacle	6.7c-f	5.3c-f	4.0a-e	3.7a-d	6.7d-h	7.0d-g
PR 8820	6.3b-e	5.3c-f	3.3a-c	2.7a	6.0b-g	6.0a-f
PR 9109	6.7c-f	6.7g	4.0a-e	4.0b-e	7.0e-h	7.0d-g
PR 9118	6.3b-e	5.7d-g	4.7c-f	4.0b-e	6.3c-h	6.7c-g
PS-105	7.3e-g	5.7d-g	4.7c-f	4.0b-e	7.0e-h	7.0d-g
PST-28M	7.0d-g	6.0e-g	4.0a-e	4.7d-g	6.7d-h	6.3b-g
Repel II (LDRD)	8.0g	6.0e-g	5.3ef	5.7g	7.3f-h	7.0d-g
Repell	7.3e-g	6.0e-g	4.7c-f	5.0e-g	7.3f-h	6.7c-g
Rodeo II	6.3b-e	4.3a-c	3.7a-d	4.0b-e	6.0b-g	6.7c-g
Toronto	6.7c-f	6.0e-g	3.7a-d	3.7a-d	4.7a-c	5.7a-e
WM-II	6.0a-d	5.0b-e	4.0a-e	3.7a-d	6.7d-h	6.7c-g
Yorktown III (LDRF)	8.0g	5.3c-f	5.7f	5.3fg	7.0e-h	7.0d-g
ZPS-2EZ	6.7c-f	4.7a-d	4.7c-f	3.7a-d	6.7d-h	7.0d-g

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

NTEP Tall Fescue Cultivar Trial

J.E. Haley, T.B. Voigt, D.J. Wehner and T.W. Fermanian

Research Protocol:	**NTEP Tall Fescue Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area worked with Ryan dethatcher; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - September 4, 1992; seeding rate - 4 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination.
Plot Maintenance:	mowing height - 2.5 inches; irrigation - to prevent wilt.
1992	pesticides - none; fertilization - 1.5 lbs N/M/yr.
1993	pesticides - postemergence broadleaf weed control herbicide; fertilization - 2.0 lbs N/M/yr.
Experimental Design:	RCB; 3 replications.

The introduction of improved "turf-type" tall fescue (*Festuca arundinacea* Schreb.) cultivars has led to increased tall fescue use where a higher quality turf is desired. These cultivars appear to have a finer texture, increased density and better tolerance to low mowing than the pasture-type tall fescues. Some research indicates that the improved cultivars have retained the good drought, heat, and wear tolerance needed in a low maintenance turf. In order to investigate the response of these cultivars to conditions found in east central Illinois a trial was established to evaluate 104 tall fescue cultivars. Ninety two of these cultivars are part of the NTEP tall fescue trial. These cultivars will be evaluated at 39 different locations across the United States.

The tall fescue cultivars were seeded on September 4, 1992. Tall fescue cultivars were evaluated for spring greenup, turfgrass quality, genetic color and texture in 1993 (Table 4). Cultivars that exhibited good spring greenup were 'Olympic II,' 'Anthem,' 'Arid,' 'Kentucky 31,' with and without endophytes. Quality was fair to good for most cultivars during April and improved steadily through May and June. Twenty-four cultivars rated 4.0 or less for quality in late July. In August, quality improved and remained fair to good through October. Cultivars that received color ratings of 8.0 or greater (Table 5) include 'Twilight,' 'Lexus,' and 'ZPS ML.' Cultivars that received at least an average texture rating of 6.7 were 'Eldorado,' 'Lancer,' 'ZPS-J3,' 'SFL,' 'MED 2-7-11,' 'FA 19,' 'Bonsai,' 'BAR Fa 214,' and 'PST 401.'

Table 4. The evaluation of tall fescue cultivars during the 1993 growing season.[1]

Cultivar	Spring Greenup[2] 3/30	Quality[3] 4/28	5/27	6/29	7/22	8/26	9/28	10/26
5PVC	5.0b-d	4.7b-f	5.3b-g	7.0c-g	3.7a-c	5.0a-d	6.3c-f	5.7a-e
Anthem	7.0hi	7.0i-k	5.7c-h	6.0b-d	5.0d-f	5.3a-e	6.7d-g	7.3f
Astro 2000	5.7d-f	5.3d-h	5.7c-h	7.0c-g	4.3b-e	6.0c-g	6.3c-f	6.0b-f
ATF-006	5.0b-d	5.0c-g	5.7c-h	5.7bc	4.0a-d	5.3a-e	6.3c-f	5.7a-e
ATF-007	4.7a-c	4.0a-d	4.7a-e	5.0ab	4.0a-d	5.3a-e	6.3c-f	5.3a-d
Austin	6.0e-g	7.3jk	6.7f-i	7.0c-g	4.7c-f	5.3a-e	6.3c-f	6.3c-f
Avanti	6.0e-g	6.0f-j	6.3e-i	6.7c-f	3.7a-c	5.0a-d	5.7a-d	5.0a-c
BAR Fa 2AB	5.0b-d	5.7e-i	5.7c-h	6.0b-d	3.7a-c	6.0c-g	7.7g	6.0b-f
BAR Fa 214	4.7a-c	4.7b-f	6.3e-i	8.3g	5.0d-f	6.3d-g	6.7d-g	6.7d-f
BAR Fa 0855	5.7d-f	5.7e-i	6.3e-i	6.3b-e	4.0a-d	6.0c-g	7.3fg	5.7a-e
Bonanza	5.7d-f	6.0f-j	6.3e-i	7.3d-g	4.0a-d	5.0a-d	6.0b-e	5.3a-d
Bonsai	4.0a	3.7a-c	5.0a-f	6.3b-e	5.0d-f	5.0a-d	6.3c-f	4.7ab
Bonsai Plus	4.3ab	4.7b-f	6.0d-i	7.0c-g	4.7c-f	6.0c-g	7.0e-g	6.0b-f
FA-19	5.0b-d	5.3d-h	5.3b-g	6.7c-f	5.0d-f	6.0c-g	7.3fg	7.0ef
FA-22	5.0b-d	4.3b-e	5.3b-g	6.0b-d	4.3b-e	6.0c-g	6.7d-g	5.7a-e
Finelawn Petite	5.0b-d	4.3b-e	6.3e-i	7.3d-g	3.7a-c	6.0c-g	7.0e-g	6.0b-f
GEN-91	5.0b-d	5.7e-i	7.0g-i	7.3d-g	5.0d-f	7.0fg	7.3fg	6.7d-f
Guardian	5.7d-f	6.7h-k	7.0g-i	7.3d-g	4.3b-e	6.0c-g	7.3fg	6.0b-f
J-1048	5.0b-d	5.0c-g	6.0d-i	7.0c-g	4.0a-d	5.3a-e	7.0e-g	5.7a-e
Ky-31 no endo	8.0j	6.7h-k	5.3b-g	5.0ab	3.7a-c	4.0a	5.0ab	5.0a-c
Lexus	5.0b-d	5.3d-h	5.7c-h	5.7bc	4.3b-e	5.7b-f	7.3fg	7.3f
MB-23-92	5.0b-d	4.7b-f	6.3e-i	6.7c-f	4.0a-d	5.3a-e	6.7d-g	6.3c-f
Montank	5.0b-d	5.7e-i	6.0d-i	6.7c-f	5.0d-f	6.0c-g	7.0e-g	6.0b-f
Pick 90-10	5.0b-d	4.7b-f	6.0d-i	7.3d-g	4.0a-d	5.7b-f	7.3fg	6.3c-f
PST-59D	4.7a-c	4.0a-d	4.7a-e	6.7c-f	3.7a-c	5.0a-d	7.0e-g	5.7a-e
PST-5PM	5.0b-d	4.7b-f	5.7c-h	7.3d-g	4.0a-d	5.3a-e	7.0e-g	7.0ef
PST-5STB	5.0b-d	5.0c-g	5.3b-g	6.0b-d	3.0a	4.7a-c	6.3c-f	5.3a-d
PST-5VC	5.0b-d	5.3d-h	6.3e-i	6.3b-e	3.3ab	5.3a-e	7.7g	6.7d-f
PSTF-401	5.7d-f	7.0	7.0g-i	7.3d-g	5.7f	6.3d-g	7.0e-g	6.3c-f
Rebel Jr	5.3c-e	7.3jk	7.7i	8.0fg	4.0a-d	6.7e-g	7.7g	6.7d-f
Rebel-3D	5.3c-e	6.0f-j	6.7f-i	7.0c-g	4.0a-d	6.0c-g	7.0e-g	5.7a-e
SR 8010	5.7d-f	6.7h-k	7.3hi	7.0c-g	4.0a-d	5.7b-f	6.7d-g	5.3a-d
SR 8300	4.7a-c	6.3g-k	7.0g-i	7.0c-g	4.0a-d	6.0c-g	7.0e-g	6.3c-f
Vegas	5.3c-e	6.3g-k	7.7i	7.7e-g	5.0d-f	6.0c-g	6.7d-g	6.0b-f
ZPS-VL	5.0b-d	4.3b-e	5.0a-f	6.3b-e	3.3ab	5.3a-e	6.3c-f	5.3a-d

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a scale of 1-9 where 9 = completely green and actively growing and 1 = dormant.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

Table 4. The evaluation of tall fescue cultivars during the 1993 growing season.[1] *(continued)*

Cultivar	Spring Greenup[2] 3/30	Quality[3] 4/28	5/27	6/29	7/22	8/26	9/28	10/26
5MX	4.7a-c	4.7b-f	5.7c-h	7.3d-g	5.0d-f	6.3d-g	7.0e-g	5.7a-e
Aztec	5.3c-e	6.0f-j	6.7f-i	6.7c-f	4.7c-f	5.7b-f	6.3c-f	6.7d-f
Bonanza II	5.7d-f	6.0f-j	6.7f-i	6.7c-f	4.3b-e	5.7b-f	6.3c-f	6.7d-f
CAS-MA21	5.0b-d	5.0c-g	5.7c-h	6.3b-e	4.0a-d	6.3d-g	6.7d-g	6.3c-f
Cochise	5.7d-f	5.0c-g	7.0g-i	6.7c-f	4.0a-d	5.3a-e	5.7a-d	5.7a-e
Duke	5.0b-d	5.3d-h	6.0d-i	6.7c-f	4.7c-f	6.0c-g	6.7d-g	5.7a-e
Eldorado	5.3c-e	6.7h-k	6.0d-i	7.3d-g	4.0a-d	5.7b-f	7.0e-g	6.0b-f
Finelawn 88	5.3c-e	5.3d-h	6.0d-i	7.0c-g	4.3b-e	5.7b-f	7.0e-g	5.7a-e
ISI-CRC	5.7d-f	5.7e-i	6.3e-i	7.7e-g	4.0a-d	6.3d-g	7.0e-g	6.0b-f
J1047	4.7a-c	3.3ab	3.7ab	6.0b-d	4.3b-e	5.3a-e	5.0ab	4.3a
Kittyhawk	5.3c-e	5.0c-g	5.7c-h	6.3b-e	4.0a-d	5.3a-e	6.7d-g	5.7a-e
KWS-DSL	5.0b-d	5.3d-h	6.7f-i	6.0b-d	4.0a-d	5.0a-d	6.0b-e	5.7a-e
Lancer	5.3c-e	6.7h-k	7.7i	7.3d-g	4.7c-f	6.0c-g	7.0e-g	6.3c-f
M-2	5.7d-f	6.0f-j	7.3hi	7.0c-g	4.0a-d	5.3a-e	6.3c-f	6.0b-f
MB-21-92	5.0b-d	4.7b-f	7.3hi	7.0c-g	4.0a-d	5.3a-e	6.0b-e	6.0b-f
MB-22-92	5.0b-d	4.3b-e	5.7c-h	6.3b-e	4.7c-f	5.7b-f	6.3c-f	7.0ef
MB-24-92	5.0b-d	4.7b-f	5.7c-h	7.0c-g	3.7a-c	5.3a-e	6.7d-g	5.7a-e
MED 10-6-8F	5.0b-d	4.7b-f	5.7c-h	7.0c-g	4.0a-d	5.3a-e	6.3c-f	5.7a-e
MED 10-7-2	5.0b-d	5.7e-i	7.0g-i	6.7c-f	3.7a-c	5.7b-f	7.3fg	6.0b-f
Micro DD	4.3ab	5.3d-h	6.0d-i	6.7c-f	3.7a-c	5.7b-f	6.7d-g	6.0b-f
Phoenix	5.3c-e	5.7e-i	6.0d-i	6.3b-e	4.3b-e	6.0c-g	6.7d-g	5.0a-c
Pick 90-12	5.0b-d	4.7b-f	6.3e-i	7.3d-g	5.0d-f	6.0c-g	7.0e-g	6.3c-f
Pick 90-6	4.0a	2.7a	4.0a-c	6.7c-f	4.7c-f	6.0c-g	6.3c-f	5.3a-d
Pick CII	5.0b-d	5.7e-i	7.3hi	8.0fg	4.7c-f	6.0c-g	7.0e-g	6.3c-f
Pixie	4.7a-c	5.0c-g	6.3e-i	8.0fg	4.0a-d	5.3a-e	6.7d-g	6.0b-f
PRO-9178	4.7a-c	5.0c-g	6.0d-i	6.7c-f	4.0a-d	6.3d-g	7.0e-g	6.7d-f
PST-5LX	4.3ab	4.3b-e	5.3b-g	7.3d-g	5.3ef	6.3d-g	6.3c-f	5.7a-e
PSTF-LF	5.3c-e	6.0f-j	6.3e-i	6.7c-f	5.0d-f	6.3d-g	6.7d-g	6.3c-f
Safari	6.3f-h	5.7e-i	6.0d-i	6.7c-f	4.0a-d	5.0a-d	6.3c-f	4.7ab
SFL	5.3c-e	5.3d-h	7.3hi	7.0c-g	4.0a-d	5.3a-e	6.7d-g	6.0b-f
Silverado	4.7a-c	4.7b-f	5.7c-h	7.0c-g	5.3ef	6.0c-g	6.7d-g	6.7d-f
SR 8400	4.7a-c	5.7e-i	7.0g-i	7.3d-g	4.0a-d	6.3d-g	7.3fg	6.3c-f
Twilight	4.7a-c	5.0c-g	4.7a-e	5.0ab	3.0a	4.0a	4.7a	4.3a
ZPS-E2	5.0b-d	5.0c-g	7.3hi	6.0b-d	3.0a	5.7b-f	6.3c-f	5.7a-e

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a scale of 1-9 where 9 = completely green and actively growing and 1 = dormant.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

Table 4. The evaluation of tall fescue cultivars during the 1993 growing season.[1] *(continued)*

Cultivar	Spring Greenup[2] 3/30	Quality[3] 4/28	5/27	6/29	7/22	8/26	9/28	10/26
5DC	4.7a-c	4.0a-d	5.0a-f	6.3b-e	3.3ab	4.7a-c	5.3a-c	4.7ab
5EX	5.3c-e	5.7e-i	5.7c-h	6.7c-f	4.3b-e	5.3a-e	6.7d-g	6.0b-f
Arid	7.0hi	7.7k	6.7f-i	5.7bc	4.0a-d	4.7a-c	6.0b-e	5.0a-c
Cafa 101	5.3c-e	6.0f-j	6.0d-i	6.3b-e	5.0d-f	6.0c-g	6.7d-g	5.3a-d
CAS-LA20	5.0b-d	4.3b-e	5.3b-g	6.7c-f	4.3b-e	5.7b-f	6.0b-e	6.0b-f
Cultivar 403	5.7d-f	6.3g-k	6.7f-i	7.0c-g	4.0a-d	6.3d-g	7.3fg	6.7d-f
Duster (ITR-90-2)	5.0b-d	5.0c-g	6.3e-i	6.0b-d	3.0a	5.3a-e	7.0e-g	5.7a-e
Falcon	5.7d-f	6.0f-j	5.7c-h	6.7c-f	4.0a-d	5.0a-d	6.0b-e	4.7ab
ISI-AFA	5.3c-e	5.7e-i	6.3e-i	6.3b-e	4.3b-e	6.3d-g	7.0e-g	5.3a-d
ISI-AFE	5.3c-e	6.0f-j	6.7f-i	6.3b-e	4.3b-e	6.7e-g	7.3fg	6.7d-f
ISI-ATK	5.7d-f	6.0f-j	6.7f-i	7.3d-g	4.0a-d	5.7b-f	7.0e-g	6.0b-f
Ky-31 w/endo	7.3ij	6.3g-k	5.3b-g	3.7a	4.0a-d	4.0a	4.7a	4.7ab
Leprechaun	5.0b-d	4.7b-f	5.7c-h	6.7c-f	4.7c-f	6.0c-g	7.0e-g	5.3a-d
MB-25-92	4.7a-c	5.7e-i	7.0g-i	7.7e-g	4.7c-f	6.3d-g	7.3fg	6.3c-f
MED 2-3-10	4.7a-c	5.7e-i	6.3e-i	6.0b-d	3.3ab	4.0a	6.0b-e	5.3a-d
MED 2-3-19	4.7a-c	4.7b-f	6.3e-i	7.0c-g	4.7c-f	5.7b-f	6.7d-g	5.0a-c
MED 2-7-11	4.3ab	4.3b-e	5.3b-g	7.3d-g	3.3ab	4.3ab	6.3c-f	5.0a-c
MED 2-9-3	4.7a-c	5.7e-i	7.0g-i	7.0c-g	3.3ab	5.0a-d	6.3c-f	6.0b-f
MED 10-1-1	5.7d-f	6.0f-j	7.3hi	7.0c-g	3.7a-c	4.7a-c	6.7d-g	5.7a-e
Monarch	5.0b-d	5.0c-g	5.3b-g	6.3b-e	3.7a-c	5.0a-d	6.3c-f	4.7ab
OFI-TF-601	5.3c-e	5.7e-i	7.3hi	6.0b-d	4.0a-d	6.0c-g	7.0e-g	5.3a-d
Olympic II	6.7g-i	7.3jk	7.0g-i	6.0b-d	4.0a-d	5.3a-e	6.3c-f	5.3a-d
PST-5DX w/endo	5.0b-d	5.3d-h	6.3e-i	6.0b-d	4.7c-f	6.3d-g	7.7g	6.7d-f
PST-RDG	5.3c-e	5.3d-h	6.0d-i	7.0c-g	3.3ab	4.3ab	6.7d-g	5.7a-e
PSTF-200	5.7d-f	6.7h-k	6.7f-i	6.7c-f	4.7c-f	6.7e-g	7.0e-g	6.0b-f
Shenandoah	5.7d-f	5.7e-i	5.7c-h	6.0b-d	3.3ab	5.0a-d	6.3c-f	5.7a-e
SIU-1	5.3c-e	6.0f-j	6.7f-i	6.3b-e	4.7c-f	6.3d-g	7.0e-g	6.0b-f
SR 8200	4.7a-c	5.0c-g	6.0d-i	7.3d-g	4.3b-e	6.0c-g	7.3fg	5.7a-e
SR 8210	5.0b-d	6.0f-j	6.7f-i	7.0c-g	3.0a	5.7b-f	6.7d-g	6.0b-f
Tomahawk	5.0b-d	5.3d-h	6.3e-i	6.7c-f	4.3b-e	6.0c-g	7.3fg	6.0b-f
Trailblazer II	5.0b-d	5.3d-h	6.7f-i	6.3b-e	4.3b-e	5.7b-f	6.7d-g	5.7a-e
Virtue	5.3c-e	5.0c-g	7.0g-i	7.3d-g	4.0a-d	6.3d-g	7.0e-g	6.0b-f
WSI-208-2	4.7a-c	3.3ab	4.3a-d	5.0ab	4.0a-d	4.7a-c	5.7a-d	5.0a-c
ZPS-J3	5.0b-d	5.7e-i	7.0g-i	8.0fg	4.7c-f	7.3g	7.7g	7.3f
ZPS-ML	4.7a-c	4.0a-d	3.3a	6.0b-d	4.0a-d	6.0c-g	6.7d-g	5.7a-e

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a scale of 1-9 where 9 = completely green and actively growing and 1 = dormant.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

Table 5. The evaluation of color and leaf texture of tall fescue cultivars during the 1993 growing season.[1]

Cultivar	Color[2] 10/01	Texture[3] 10/25	Cultivar	Color[2] 10/01	Texture[3] 10/25
Avanti	5.7c-e	5.3a-c	Lancer	6.7e-h	6.7de
Lexus	8.0ij	6.3c-e	Silverado	6.7e-h	6.3c-e
Vegas	6.0c-f	5.0ab	Pick 90-12	7.3g-j	6.3c-e
Austin	6.7e-h	5.7b-d	Pixie	6.7e-h	6.3c-e
BAR Fa 214	5.0a-c	7.0e	Pick 90-6	7.3g-j	6.0b-e
BAR Fa 2AB	7.0f-i	5.3a-c	PRO-9178	6.7e-h	6.0b-e
BAR Fa 0855	7.3g-j	6.0b-e	Twilight	8.0ij	5.3a-c
GEN-91	7.7h-j	6.0b-e	KWS-DSL	7.0f-i	6.0b-e
PST-5VC	7.0f-i	6.0b-e	Micro DD	6.3d-g	5.7b-d
J-1048	7.3g-j	5.7b-d	Finelawn 88	6.3d-g	5.7b-d
Anthem	4.3ab	6.3c-e	Kittyhawk	5.7c-e	6.0b-e
5PVC	6.0c-f	6.0b-e	Aztec	7.7h-j	6.3c-e
Bonanza	5.7c-e	5.0ab	Bonanza II	7.0f-i	6.0b-e
Guardian	6.0c-f	6.3c-e	SR 8400	6.0c-f	5.7b-d
ZPS-VL	7.7h-j	6.0b-e	MED 10-7-2	6.3d-g	6.3c-e
PST-5PM	6.7e-h	6.0b-e	Duke	6.3d-g	6.3c-e
Montank	6.3d-g	5.7b-d	J1047	6.7e-h	5.3a-c
PST-5STB	6.7e-h	5.7b-d	MED 10-6-8F	5.7c-e	6.0b-e
Rebel Jr	6.3d-g	6.3c-e	PST-5LX	7.0f-i	6.3c-e
PST-59D	7.3g-j	6.0b-e	Phoenix	6.3d-g	5.0ab
SR 8010	6.0c-f	6.0b-e	PSTF-LF	6.3d-g	6.0b-e
ATF-006	7.3g-j	6.0b-e	SFL	6.7e-h	6.7de
ATF-007	7.0f-i	6.0b-e	Pick CII	6.7e-h	6.0b-e
FA-19	7.0f-i	6.7de	M-2	6.3d-g	6.3c-e
FA-22	6.3d-g	6.0b-e	ZPS-E2	6.3d-g	6.3c-e
Rebel-3D	6.7e-h	5.3a-c	Eldorado	7.3g-j	6.7de
Bonsai	7.0f-i	6.7de	MB-22-92	6.3d-g	5.7b-d
Bonsai Plus	7.0f-i	5.0ab	CAS-MA21	6.3d-g	6.3c-e
SR 8300	6.3d-g	5.7b-d	ISI-CRC	6.7e-h	6.3c-e
Ky-31 no endo	4.0a	4.3a	5MX	7.0f-i	6.0b-e
PSTF-401	6.7e-h	7.0e	Cochise	6.0c-f	5.3a-c
Finelawn Petite	7.3g-j	6.0b-e	MB-21-92	7.0f-i	6.0b-e
Pick 90-10	6.7e-h	6.3c-e	MB-24-92	7.3g-j	6.3c-e
MB-23-92	6.7e-h	6.3c-e	Safari	6.3d-g	6.3c-e
Astro 2000	5.7c-e	6.3c-e	Olympic II	6.3d-g	6.0b-e

(continued)

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Color evaluations are made on a 1-9 scale where 1=tan turf and 9=darkest green.

[3] Texture evaluations are made on a 1-9 scale where 1=very coarse turfgrass blade and 9=very fine turfgrass blade.

Table 5. The evaluation of color and leaf texture of tall fescue cultivars during the 1993 growing season [1] *(continued)*.

Cultivar	Color[2] 10/01	Texture[3] 10/25	Cultivar	Color[2] 10/01	Texture[3] 10/25
5EX	6.7e-h	6.0b-e	Trailblazer II	7.3h-j	5.7b-d
Cafa 101	5.7c-e	5.3a-c	ISI-ATK	6.7e-h	6.0b-e
CAS-LA20	6.7e-h	6.3c-e	SR 8200	7.3h-j	6.3c-e
Cultivar 403	7.0f-i	6.3c-e	Falcon	5.0a-c	6.0b-e
Ky-31 w/endo	4.0a	4.3a	ISI-AFA	7.3h-j	5.7b-d
MED 2-3-10	6.0c-f	6.0b-e	ISI-AFE	7.0f-i	6.3c-e
MED 2-7-11	7.0f-i	6.7de	Arid	4.3ab	5.7b-d
MED 10-1-1	6.3d-g	6.3c-e	SIU-1	6.3d-g	6.3c-e
Monarch	5.7c-e	6.0b-e	Leprechaun	6.7e-h	5.7b-d
PST-5DX w/endo	7.7h-j	5.7b-d	OFI-TF-601	7.0f-i	5.7b-d
PST-RDG	7.7h-j	5.7b-d	Duster (ITR-90-2)	7.0f-i	5.7b-d
Shenandoah	5.3b-d	5.3a-c	SR 8210	6.3d-g	5.7b-d
Tomahawk	7.7h-j	6.3c-e	MED 2-3-19	6.7e-h	5.3a-c
Virtue	7.0f-i	6.0b-e	5DC	6.7e-h	5.0ab
WSI-208-2	6.0c-f	5.3a-c	PSTF-200	6.3d-g	6.0b-e
ZPS-J3	7.7h-j	6.7de	MB-25-92	7.7h-j	6.3c-e
ZPS-ML	8.3j	6.0b-e	MED 2-9-3	6.7e-h	6.3c-e

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Color evaluations are made on a 1-9 scale where 1=tan turf and 9=darkest green.

[3] Texture evaluations are made on a 1-9 scale where 1=very coarse turfgrass blade and 9=very fine turfgrass blade.

NTEP Fine Fescue Cultivar Trial

J.E. Haley, T.W. Fermanian, T.B. Voigt and D.J. Wehner

Research Protocol:	**NTEP Fine Fescue Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area rototilled and graded; fertilized - 1 lb N/M.
Seeding/ Establishment:	seeding date - September 21, 1993; seeding rate - 4.4 lbs seed/M; plot size - 5 ft x 5 ft; straw mulch at 1.5 bales/M; irrigation - to insure germination.
Plot Maintenance:	mowing height - 2.5 inches; irrigation - none;
Experimental Design:	RCB; 3 replications.

Fine fescue is a common name used to describe several turfgrass species and subspecies in the genus *Festuca.* These species all have a fine leaf blade and are adapted to a wide range of climates and management practices. They are used in seed mixtures for use in home lawns, on roadsides, and golf course roughs. Some fine fescues are used to overseed greens in subtropical climates for winter color and play. Fine fescues used as turfgrass include creeping red fescue, a strong creeping type and a slender creeping type (*Festuca rubra* L ssp. *rubra* and *Festuca rubra* L. ssp. *trichophylla* Gaud. or ssp. *litoralis*). Chewings fescue (*F. rubra* L. subsp. *commutata* Gaud.), sheep fescue (*F. ovina*) and hard fescue (*F. longifolia*) have bunch type growth habit. Creeping and chewings fescue are best adapted to well drained, moderately shaded sites with low to moderate management. They tolerate mowing heights of 1.5-2.0 inches and grow best with fertilization at 2 lbs N/M/yr or less. Sheep fescue is best adapted to sites of very low management. It is often used for soil stabilization on well-drained sandy or gravelly soils. It does not mix well with other types of turfgrass due to its bunch type growth habit and its stiff bluish-green leaves. Like the other fine fescues, hard fescue does well in dry soils of low fertility, however, it is more tolerant to moist, fertile soils and close mowing than sheep fescue. Because of the low management needs of fine fescues, effort has been made to develop new cultivars with better heat tolerance and disease resistance. NTEP has designed a fine fescue trial that will examine 60 fine fescue cultivars at 32 sites across the United States (26 chewings, 15 hard, 2 sheep 17 creeping). The evaluation was established at the University of Illinois in September 1993. Turfgrass cover is presented in Table 6. Cover reflects the rate of establishment and seedling vigor. Twenty nine cultivars provided at least 50% plot cover 31 days following seeding.

Table 6. The evaluation of fine fescue cultivars following establishment by seed on September 21, 1993.[1]

Cultivar	% Cover[2] 10/22	Cultivar	% Cover[2] 10/22
NJ F-93	55.0k-s	Darwin	33.3c-h
Dawson	68.3q-u	FO 143	43.3e-m
Scaldis	15.0ab	Aruba	60.0m-t
Ecostar	70.0r-u	WX3-FFG6	46.7g-n
Rondo	50.0h-p	WX3-FF54	56.7l-s
Pamela	41.7e-l	Brittany	46.7g-n
Medina	26.7b-e	Spartan	48.3g-o
WVPB-STCR-101	48.3g-o	Banner II	68.3q-u
Brigade	21.7a-d	MB 61-93	51.7i-q
Molinda	40.0e-l	MB 63-93	28.3b-f
BAR Frr 4ZBD	53.3j-r	MB 64-93	50.0h-p
BAR UR 204	66.7p-u	MB 65-93	46.7g-n
Jasper	53.3j-r	MB 66-93	35.0c-i
Victory	66.7p-u	MB 81-93	18.3a-c
Pick 4-91W	53.3j-r	MB 82-93	31.7b-g
Bridgeport	50.0h-p	MB 83-93	36.7d-j
Nordic	61.7n-t	SR 3100	45.0f-n
ZPS-MG	75.0tu	SR 5100	68.3q-u
Seabreeze	60.0m-t	PRO 92/20	65.0o-u
PST-4VB Endo	38.3d-k	PRO 92/24	50.0h-p
PST-4DT	38.3d-k	Reliant II	15.0ab
Shademaster II	35.0c-i	CAS-FR13	33.3c-h
Shadow E	26.7b-e	ISI-FC-62	41.7e-l
Discovery	21.7a-d	TMI-3CE	55.0k-s
Tiffany	51.7i-g	Cultivar 67135	7.3a
PST-4ST	40.0e-l	Aurora endo	31.7b-g
PST 44D	45.0f-n	ZPS-4BN	60.0m-t
Flyer	61.7n-t	Cascade	81.7u
Jamestown II	76.7tu	Common creeping	61.7n-t
Jamestown	71.7s-u	MED 32	31.7b-g

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Percent cover refers to the area of the plot covered by turf. This reflects the rate of eultivar establishment.

1990 NTEP Bentgrass Trial

D.J. Wehner and J.E. Haley

Research Protocol:	**NTEP 1990 Bentgrass Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area surfaced tilled; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - August 30, 1990; seeding rate - 2 lbs seed/M; plot size - 10 ft x 6 ft; irrigation - to insure germination.
Plot Maintenance:	mowing height - greens, 0.25 inches, fairway, 0.5 inches.
1991	pesticides - Lescosan in April; irrigation - to prevent wilt; fertilization - 1.17s lb N/M, 48 g Fe/M/yr; fungicides - throughout the season to control and prevent disease.
1992	pesticides - none; irrigation - to prevent stress; fertilization - 5 lbs N/M, 33.4 g Fe/M/yr; fungicides - throughout the season to control and prevent disease.
1993	pesticides - none; irrigation - to prevent stress; fertilization - 4.5 lbs N/M, 33.4 g Fe/M/yr; fungicides - throughout the season to control and prevent disease.
Experimental Design:	RCB; 3 replications.

Over the last few years, two factors have resulted in an increased interest in creeping bentgrass (*Agrostis palustris*). These factors are the use of creeping bentgrass for golf course fairways and increased construction of golf courses. Commercial and public breeders responded to the increased interest in creeping bentgrass by developing new cultivars. There is some interest in other species of bentgrass such as dryland bentgrass (*Agrostis castellana*), browntop bentgrass (*Agrostis capillaris*), and colonial bentgrass (*Agrostis tenuis*) for golf course applications. The purpose of this study is to evaluate new cultivars of bentgrass for use as fairway and putting green turf. Two sets of plots were established in the fall of 1990, one set is being mowed at putting green height while the other is being mowed at fairway height.

Results of Putting Green Height of Cut - 1990 Trial. The third year of data for this trial was collected during 1993 (Table 7). The cultivars that provided the highest quality ratings over the season were 'Forbes 89-12,' 'Penncross,' 'Penneagle,' 'Pennlinks,' 'Providence,' 'Putter,' and 'WVPB 89-D-15.' Plots of these entries had the lowest level of annual bluegrass contamination and were the least damaged by the brown patch disease (*Rhizoctonia* spp.) outbreak that occurred in July.

Results of the Fairway Height of Cut - 1990 Trial. The quality of the fairway height of cut plots was generally higher than that of the putting green height of cut plots (Table 8). The entries receiving the highest quality scores were 'Carmen,' 'Putter,' 'Providence,' 'Penneagle,' 'Normarc 101,' 'Forbes 89-12,' and 'Cobra.' As with the putting green study, these entries showed less incidence of brown patch disease.

Table 7. The evaluation of bentgrass cultivars mowed at the putting green height of cut during the 1993 growing season.[1]

Cultivar	Quality[2]				% Annual Bluegrass[3]	Brown Patch[4]
	4/28	6/5	6/29	7/27	4/28	7/19
88.CBE	3.3ab	3.3b-d	4.3bc	4.3bc	13.3a-c	9.0d
88.CBL	4.0b-d	3.3b-d	4.3bc	5.0b-d	15.0b-d	9.0d
Allure[5]	3.7a-c	2.0a	3.0a	3.0a	26.7e	7.3b-d
Bardot[5]	3.7a-c	4.3e	4.0a-c	3.0a	25.0e	5.3ab
BR 1518[6]	3.0a	2.7ab	3.0a	3.0a	29.0e	6.7a-c
Carmen	4.0b-d	3.0bc	4.3bc	4.0ab	11.7a-c	9.0d
Cobra	4.3c-e	3.7c-e	4.3bc	5.3c-e	10.7a-c	9.0d
Egmont[7]	4.0b-d	4.3e	5.0c-e	5.0b-d	13.3a-c	7.3b-d
Emerald	4.3c-e	4.0de	4.3bc	5.0b-d	10.0ab	8.3cd
Forbes 89-12	5.0e	4.3e	4.3bc	6.0de	5.0a	9.0d
National	4.3c-e	3.7c-e	4.0a-c	4.3bc	20.0c-e	9.0d
Normarc 101	4.7de	3.3b-d	4.3bc	5.3c-e	7.3ab	9.0d
Penncross	4.3c-e	4.3e	4.7b-d	5.7de	9.3ab	9.0d
Penneagle	4.7de	3.7c-e	5.0c-e	5.7de	8.0ab	9.0d
Pennlinks	5.0e	4.3e	6.0e	6.3e	5.7ab	9.0d
Providence	4.7de	4.0de	5.7de	6.0de	7.7ab	8.3cd
Putter	4.7de	4.0de	5.0c-e	5.7de	9.0ab	9.0d
SR 1020	4.3c-e	3.3b-d	4.7b-d	5.7de	8.0ab	9.0d
Tracenta[5]	3.0a	3.0bc	3.7ab	3.0a	23.3de	5.0a
WVPB 89-D-15	4.7de	4.0de	4.3bc	6.3e	8.0ab	9.0d

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[3] Percent annual bluegrass evaluations are a visual estimate of percent of the plot covered with annual bluegrass plants.

[4] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

[5] This is a colonial bentgrass cultivar.

[6] This is a dryland bentgrass cultivar.

[7] This is a browntop bentgrass cultivar

Table 8. The evaluation of bentgrass cultivars mowed at the fairway height of cut during the 1993 growing season.[1]

	Quality[2]				Brown Patch[3]
Cultivar	4/28	6/4	6/29	7/27	7/19
Allure[4]	3.0a	4.0ab	4.0ab	4.0a-c	5.7ab
Bardot[1]	3.3ab	4.0ab	4.3a-c	3.3a	3.3a
BR 1518[5]	3.0a	3.3a	3.7a	3.7ab	7.0bc
Carmen	5.7ef	5.7de	6.3e-g	6.0c-e	8.3c
Cobra	6.3f	5.7de	5.7c-g	6.7de	8.3c
Egmont[6]	3.3ab	3.7a	5.0a-e	4.0a-c	4.0a
Emerald	5.3de	5.0cd	5.7c-g	5.0a-d	8.0bc
Forbes 89-12	5.3de	4.7bc	6.0d-g	7.0de	9.0c
National	4.0bc	3.7a	5.0a-e	5.3a-e	8.7c
Normarc 101	6.3f	6.3e	6.7fg	5.3a-e	8.3c
Penncross	5.3de	5.7de	5.7c-g	6.0c-e	9.0c
Penneagle	6.0ef	6.0e	6.7fg	7.3e	9.0c
Providence	6.3f	6.0e	7.0g	5.7b-e	9.0c
Putter	5.7ef	5.7de	6.7fg	5.3a-e	8.3c
SR 1020	6.3f	5.7de	5.3b-f	4.0a-c	5.7ab
TAMU 88-1	5.3de	4.7bc	5.7c-g	6.0c-e	8.0bc
Tracenta[1]	3.0a	4.0ab	4.7a-d	4.0a-c	4.3a
WVPB 89-D-15	4.7cd	5.0cd	5.7c-g	5.3a-e	8.3c

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[3] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

[4] This is a colonial bentgrass cultivar.

[5] This is a dryland bentgrass cultivar.

[6] This is s browntop bentgrass cultivar.

1993 NTEP Bentgrass Evaluation

D.J. Wehner and J.E. Haley

Research Protocol:	**1993 NTEP Bentgrass Cultivar Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	existing vegetation killed with Roundup; area surfaced tilled; fertilized at 1 lb N/M, an additional 1 lb N/M was applied after germination.
Seeding/ Establishment:	seeding date - September 10, 1993; seeding rate - 0.5 lb seed/M; plot size - 5 ft x 5 ft; irrigation - to insure germination.
Experimental Design:	RCB; 3 replications.

In the fall of 1993, the 1990 NTEP Bentgrass Trials were replaced with new entries. The 1993 test has been expanded to include approximately twice the number of entries as the earlier study. As with the earlier study, two sets of plots have been established; one set will be mowed at putting green height and the other at fairway height. Tables 9 and 10 indicate the percent plot cover at the end of September from the seeding in early September.

Table 9. The evaluation of the 1993 NTEP bentgrass cultivars to be mowed at greens height following establishment by seed on September 10, 1993.[1]

Cultivar	Cover[2] 9/29	Cultivar	Cover[2] 9/29
Cultivar 18th Green	7.3a-d	Syn 92-5-93	10.7a-f
Regent	16.7e-g	Penncross	16.7e-g
BAR AS 493	9.3a-e	A-1	9.0a-e
BAR Ws 42102	10.7a-f	A-4	15.7d-g
Trueline	5.7ab	G-2	11.3a-f
Seaside	21.7g	G-6	6.0ab
Cato	8.0a-d	Pennlinks	13.3a-g
PRO/CUP	16.7e-g	DG-P	5.3a
Crenshaw	18.3fg	MSUEB	10.0a-f
Southshore	15.0c-g	L-93	8.3a-e
Providence	18.3fg	Lopez	7.0a-c
SR 1020	13.3a-g	Tendez[3]	10.7a-f
Syn 92-1-93	14.0b-g	ISI-Ap-89150	8.0a-d
Syn 92-2-93	11.0a-f	Syn-1-88	21.7g

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Cover represents the area of the plot covered with turfgrass. It reflects germination and seedling vigor.

[3] This is a colonial bentgrass cultivar.

Table 10. The evaluation of the 1993 NTEP bentgrass cultivars to be mowed at fairway height following establishment by seed on September 10, 1993.[1]

Cultivar	Cover[2] 9/29	Cultivar	Cover[2] 9/29
Cltvr 18th Green	8.3ab	SR 7100[3]	8.3ab
BAR AS 493	3.7a	Penncross	11.7b-d
BAR Ws 42102	9.0a-c	DF-1	10.0a-c
Trueline	16.7de	G-2	6.0ab
Providence	16.7de	G-6	5.7ab
Seaside	20.0e	Penneagle	11.7b-d
Cato	10.0a-c	Lopez	6.7ab
Exeter[3]	9.0a-c	Tendez[3]	6.3ab
PRO/CUP	11.7b-d	ISI-At-90162[3]	5.7ab
Crenshaw	15.0c-e	OM-At-90163[3]	9.0a-c
Southshore	9.3a-c		

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Cover represents the area of the plot covered with turfgrass. It reflects germination and seedling vigor.

[3] This is a colonial bentgrass cultivar.

1993 Buffalograss Cultivar Quality Evaluation

T.B. Voigt and J.E. Haley

Research Protocol:	**1991 NTEP Buffalograss Cultivar Trials**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	area rotary tilled; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - June 28, 1991 plugging rate - 6 to 24 plugs/plot; plot size - 7 ft x 7 ft; irrigation - to insure establishment; pesticides - preemergence application of Simazine.
Plot Maintenance:	mowing height - 2.0 inches;
1991	pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none after establishment; fertilization - none after establishment.
1992	pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none; fertilization - none.
1993	pesticides - broad spectrum postemergence broadleaf herbicide, preemergence control with Princep in April and July; irrigation - none; fertilization - none.
Experimental Design:	RCB; 3 replications.

Interest in drought and heat tolerant grasses for Illinois has increased as a result of the severe growing conditions during the 1988 and 1991 growing seasons. Many warm season grasses exhibit great tolerance for hot and dry conditions and limited management inputs. Not all warm season grasses, however, tolerate the winter conditions of Illinois. Buffalograss (*Buchloe dactyloides* Linneaus) is a warm season species currently receiving attention from turfgrass researchers and managers because it is tolerant of temperature and moisture extremes, is adaptable to many sites, requires limited maintenance, and has few pest problems. This research evaluates the quality of twenty-two buffalograss cultivars and their performance in central Illinois during the 1993 growing seasons.

All plots were installed using plants produced at the University of Nebraska. The plants originated as vegetatively produced clones of a single genotype, or as plants selected from a seeded population. Table 11 provides a list of cultivars planted, their producers, and whether they have a vegetative or seed origin.

Objectives were formulated for this research. The objectives are:

- to determine if there are differences among the performance twenty-two buffalograss cultivars;
- to determine which buffalograss cultivars perform best in central Illinois; and
- to produce buffalograss cultivar recommendations based on performance.

Weather conditions play a great role in the quality of all twenty-two buffalograss cultivars. When weather is wet throughout the growing season, as was the case in both

1992 and 1993, cool season grasses and weeds can be troublesome invaders. When dormant in spring and autumn, none of the buffalograss cultivars can compete with these types of rivals. To control weeds, herbicides can be used, but the turf manager must determine if buffalograss is worth this degree of culture. If higher management inputs are an option, there are other grasses capable of producing higher quality turf.

Table 11. Cultivar, source, and origin of twenty-two buffalograss cultivars included in the 1992-93 NTEP evaluation in Urbana, Illinois.

Cultivar	Source	Origin
AZ143	University of Arizona	vegetative
BAM101	Bamert Seed Company	seeded
BAM202	Bamert Seed Company	seeded
Bison	Native Turf Development Group	seeded
Bufflawn	Quality Turfgrass, Houston, TX	vegetative
Highlight 15	River City Turf Farm, Sacramento, CA	vegetative
Highlight 25	The Grass Farm, Morgan Hill, CA	vegetative
Highlight 4	University of California, Davis	vegetative
NE 84-315	University of Nebraska	vegetative
NE 84-436	Crenshaw/Douget Turfgrass, Austin, TX	vegetative
NE 84-45-3	University of Nebraska	vegetative
NE 84-609	University of Nebraska	vegetative
NE 85-378	University of Nebraska	vegetative
NTDG-1	Native Turf Development Group	seeded
NTDG-2	Native Turf Development Group	seeded
NTDG-3	Native Turf Development Group	seeded
NTDG-4	Native Turf Development Group	seeded
NTDG-5	Native Turf Development Group	seeded
Prairie	Texas A & M University	vegetative
Rutgers	Rutgers University	vegetative
Sharps Improved	Sharp Brothers Seed, Healy, KS	seeded
Texoka	original source unknown	seeded

There were significant differences among the twenty-two cultivars in the evaluation as determine by statistical testing. The overall means for the eleven evaluations appear in Table 12. Means were separated using Fisher's Protected LSD (Table 12).

Based on results of quality evaluations in 1992 (see *1992 Illinois Turfgrass Research Report*) and 1993, it is obvious that there are significant differences among the twenty-two buffalograss cultivars included in the study. The cultivars that had above average monthly quality ratings for each of the eleven evaluations were 'NE 84-315,' 'NTDG 1,' 'NTDG 3,' 'NTDG 4,' and 'NTDG 5.' Based on our evaluation criteria, these types produced an acceptable low- to moderate-quality turf, and would be recommended for planting in Illinois. Unfortunately, none of these cultivars are currently available in the trade.

Table 12. Means of twenty-two buffalograss cultivars evaluated for turf quality in 1993.[1]

Cultivar	Quality[2]				
	May	June	July	August	September
AZ143	4.0d-f	5.3de	4.7de	4.3b-e	4.3d-g
BAM101	3.0bc	5.0c-e	4.7de	5.3e	3.3b-e
BAM202	3.0bc	5.0c-e	4.3de	4.7c-e	4.3d-g
Bison	3.0bc	3.7b	4.0c-e	4.3b-e	4.0d-g
Bufflawn	1.7a	2.3a	3.0bc	3.7a-d	3.0b-d
Highlight 15	1.7a	2.3a	3.0bc	2.3a	2.3a-c
Highlight 25	1.3a	1.7a	2.3ab	3.3a-c	2.0ab
Highlight 4	1.0a	1.3a	1.7a	3.0ab	1.3a
NE 84-315	5.0g	5.7e	5.0e	5.7e	4.7e-g
NE 84-436	4.0d-f	5.0c-e	4.7de	5.3e	4.3d-g
NE 84-45-3	3.0bc	4.3b-d	3.7cd	3.7a-d	3.3b-e
NE 84-609	4.0d-f	4.7b-e	5.0e	5.7e	5.3g
NE 85-378	4.7fg	5.3de	4.3de	5.3e	4.7e-g
NTDG-1	3.7c-e	5.3de	4.0c-e	5.0de	4.3d-g
NTDG-2	4.7fg	4.7b-e	4.0c-e	4.7c-e	4.3d-g
NTDG-3	4.0d-f	5.7e	5.0e	5.0de	4.7e-g
NTDG-4	4.7fg	5.7e	4.3de	4.7c- e	4.3d-g
NTDG-5	4.3e-g	5.7e	4.3de	5.0de	5.0fg
Prairie	2.7b	4.0bc	4.7de	5.3e	5.3g
Rutgers	1.7a	2.0a	2.3ab	3.0ab	3.0b-d
Sharps Improved	3.3b-d	4.7b-e	4.3de	5.0de	4.7e-g
Texoka	2.7b	3.7b	4.3de	4.3b-e	3.7c-f
LSD.05	1.0	1.2	1.2	1.4	1.6

Additional research is needed to further evaluate these twenty-two buffalograss cultivars in varied environmental and management conditions so that a complete package of selection, use, and culture recommendations can be developed for Illinois. These continued studies will refine and enhance our knowledge of buffalograss and its appropriate use in Illinois.

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

1991 NTEP Zoysiagrass Cultivar Trials

T. B. Voigt and J. E. Haley

In areas of the Midwest having regularly hot and dry growing conditions, warm season grasses generally provide better summer performance than their cool season counterparts. For example, zoysiagrass, bermudagrass, and buffalograss often perform well when summer heat and drought, such as were the cases in 1988 and 1991, force unirrigated Kentucky bluegrasses, fine fescues, and perennial ryegrasses into dormancy.

Research Protocol:	**1991 NTEP Zoysiagrass Cultivar Trials**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	area rotary tilled; fertilized at 1 lb N/M.
Seeding/ Establishment:	seeding date - June 28, 1991 plugging rate - 6 to 24 plugs/plot; plot size - 7 ft x 7 ft; irrigation - to insure establishment; pesticides - preemergence application of Simazine.
Plot Maintenance:	mowing height - 2.0 inches;
1991	pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none after establishment; fertilization - none after establishment.
1992	pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none; fertilization - none.
1993	pesticides - broad spectrum postemergence broadleaf herbicide, preemergence control with Princep in April and July; irrigation - none; fertilization - none.
Experimental Design:	RCB; 3 replications.

Zoysiagrass (*Zoysia* spp.) is of particular interest due to its many positive attributes. It is extremely heat and drought tolerant; is dense and tough; tolerates wear well; resists weed invasions after establishment; tolerates light to moderate shade; and has limited insect and disease problems. There are some drawbacks to the use of zoysiagrass. These include its short growing season; it is slow and expensive to establish; it can be invasive and spread into adjacent turf and planting areas; it can be difficult to eliminate once it is established; and it produces much thatch. Taken in total, zoysiagrass can be a useful turfgrass in the Midwest, provided it is positive attributes are capitalized upon and its negative properties are understood and minimized.

During the summer of 1991, a NTEP Zoysiagrass study was initiated in Urbana. The twenty-four zoysiagrass cultivars, sources, and origins are listed in Tables 13. The purpose of these trials is to evaluate zoysiagrass selections for their suitability for utility or lawn uses in the northern two-thirds of Illinois, with primary interest in overall turf quality. Data was collected beginning in 1992, and the evaluation is scheduled to last three to five years.

Table 13. Cultivar, source, and origin of twenty-four cultivars included in the 1991 NTEP zoysiagrass evaluation in Urbana, Illinois.

Cultivar	Source	Origin
Belair	NTEP (Kevin Morris)	vegetative
CD2013	TG Services, Inc. (Jack Murray)	vegetative
CD259-13	TG Services, Inc. (Jack Murray)	vegetative
DALZ8501	Texas A&M University (M. C. Engelke)	vegetative
DALZ8502	Texas A&M University (M. C. Engelke)	vegetative
DALZ8507	Texas A&M University (M. C. Engelke)	vegetative
DALZ8508	Texas A&M University (M. C. Engelke)	vegetative
DALZ8512	Texas A&M University (M. C. Engelke)	vegetative
DALZ8514	Texas A&M University (M. C. Engelke)	vegetative
DALZ8516	Texas A&M University (M. C. Engelke)	vegetative
DALZ8701	Texas A&M University (M. C. Engelke)	vegetative
DALZ9006	Texas A&M University (M. C. Engelke)	vegetative
El Toro	U. of Cal., Riverside (Richard Autio)	vegetative
Emerald	NTEP (Kevin Morris)	vegetative
GT2004	TG Services, Inc. (Jack Murray)	vegetative
GT2047	TG Services, Inc. (Jack Murray)	vegetative
JZ-1 lot A89-1	Jacklin Seed Company	seed
Korean Common Seed	NTEP (Kevin Morris)	seed
Meyer	NTEP (Kevin Morris)	vegetative
Sunburst	Fred Grau	vegetative
TC2033	TG Services, Inc. (Jack Murray)	vegetative
TC5018	TG Services, Inc. (Jack Murray)	vegetative
TGS-B10	TG Services, Inc. (Jack Murray)	seed
TGS-W10	TG Services, Inc. (Jack Murray)	seed

There were significant differences in overall zoysiagrass quality on each of the six monthly evaluations (Table 14). Zoysiagrass quality performance was evaluated each month, May through September. Overall quality was evaluated on a one through nine scale with one being dead or completely dormant, five being minimally acceptable for lawn use, and nine as being extremely high quality. Ratings were based on turf color, density, rate of spread, texture, and uniformity.

Five of the selections, 'CD259-13,' 'DALZ8512,' 'El Toro,' 'Emerald,' and 'TC5018,' produced consistently high quality turf throughout the 1993 growing season. These five, of the twenty-four in the evaluation, were the only cultivars with quality ratings in the upper half of the entire group at each monthly evaluation.

When combined with 1992 data (see *1992 Illinois Turfgrass Research Report*), only four cultivars were rated in the upper half of the group at each of the eleven evaluations. These four top performers were, 'CD259-13,' 'DALZ8512,' 'El Toro,' and 'TC5018.' Only 'El Toro,' a California selection, is available commercially at this time.

It is too early, however, to make zoysiagrass recommendations for the northern two-thirds of Illinois. This test will continue for at least one more year, and at the conclusion of this trial, recommendations will be made.

Table 14. Quality ratings for the 1991 NTEP zoysiagrass evaluation in Urbana, Illinois during the 1993 growing season.[1]

	Quality[2]				
Cultivar	5/12	6/11	7/29	8/27	9/30
Belair	4.3f-h	4.3fg	6.7e-g	5.0cd	5.7ef
CD2013	3.7d-f	5.3hi	5.7c-e	5.7c-f	5.0c-e
CD259-13	5.3i	5.7i	6.7e-g	5.7c-f	5.0c-e
DALZ8501	1.0a	1.0a	2.0ab	1.7ab	1.3a
DALZ8502	1.0a	1.3a	1.7a	2.0ab	1.0a
DALZ8507	3.0cd	4.0ef	5.7c-e	5.7c-f	4.3c
DALZ8508	2.0b	3.0cd	5.0c	4.7c	4.7cd
DALZ8512	4.0e-g	5.3hi	6.7e-g	6.7ef	6.0f
DALZ8514	3.3c-e	4.0ef	6.0c-f	5.7c-f	5.0c-e
DALZ8516	2.0b	2.3bc	3.0b	3.0b	2.7b
DALZ8701	1.0a	1.7ab	1.7a	1.3a	1.0a
DALZ9006	2.0b	3.3de	6.0c-f	5.0cd	4.7cd
El Toro	4.0e-g	5.0g-i	7.3g	7.0f	5.3d-f
Emerald	2.7bc	4.3fg	5.0c	4.7c	4.7cd
GT2004	3.3c-e	4.7f-h	5.7c-e	5.7cdef	5.3d-f
GT2047	4.3f-h	5.0g-i	5.7c-e	5.7c-f	4.7cd
JZ-1 lot A89-1	4.3f-h	5.0g-i	5.7c-e	6.0c-f	5.7ef
Korean Common Seed	4.7g-i	5.0g-i	5.3cd	5.7c-f	6.0f
Meyer	3.3c-e	4.3fg	6.7e-g	5.7c-f	5.3d-f
Sunburst	5.0hi	4.7f-h	6.3d-g	5.3c-e	5.3d-f
TC2033	2.7bc	3.3de	5.7c-e	5.7c-f	4.7cd
TC5018	4.7g-i	5.3hi	6.0c-f	6.0c-f	5.7ef
TGS-B10	4.7g-i	5.7i	7.0fg	6.3d-f	5.7ef
TGS-W10	4.3f-h	4.7f-h	6.0c-f	6.0c-f	5.3d-f
LSD .05	0.8	1.0	1.2	1.4	0.9

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

CULTIVAR EVALUATION AT SOUTHERN ILLINOIS UNIVERSITY, CARBONDALE, IL.

NTEP Kentucky Bluegrass Cultivar Trial

K.L. Diesburg

Research Protocol:	**NTEP Kentucky Bluegrass Cultivar Trial**
Location:	Southern Illinois University, Carbondale, IL.
Site:	Hosmer silt clay loam.
Seeding/ Establishment:	date seeded - September 20, 1990; seeding rate - 3 lbs/M; plot size - 5 ft x 5 ft.
Plot Maintenance:	mowing height - 1.5 inches, high maintenance and 2.25 inches, low maintenance; irrigation - to prevent stress, high maintenance and none, low maintenance; pesticides - Ronstar in April, Dacthal in June, Turflon D in April and November; fertilization - 6 lb N/M/yr (SCU & UF) high maintenance and 1 lb N/M/yr low maintenance.
Experimental Design:	RCB; 3 replications.

Southern Illinois is an excellent place to test the heat, drought, or poor soil tolerance of Kentucky bluegrass (*Poa pratensis*). Kentucky bluegrass is the mainstay of turf throughout central to northern Illinois as well the rest of the upper midwest. In southern Illinois, however, this species has a tough time surviving in low-management situations. It persists to a limited extent and is usually dominated by tall fescue, zoysiagrass, or bermudagrass, whichever happens to be present. Kentucky bluegrass will persist and actually thrive, however, in this transition zone if it receives adequate supplemental nutrition, and timely irrigation. For this reason the new national trial, which was established during fall 1990, was organized by the USDA into two separate experiments, high and low management. The lineup of entries is different between the two trials because there are many cultivars adapted specifically to heat and drought stress, whereas other cultivars will do well only under high management, low stress conditions.

The advantage in color, slow growth, and lower canopy of the elite cultivars is starting to become apparent under high management. As long as sufficient moisture and nutrients are provided the cultivars best adapted to high management at a lower clipping height will rank in the upper half of Table 1. Ranking in Table 2 is entirely different than that of Table 1. Lack of moisture in the presence of prolonged heat, even at a higher clip, takes its toll on cultivars lacking physiologic and morphogenic mechanisms to withstand summer stress. In general, the slow-growing cultivars that excel under high management, often lack these mechanisms. A few of the top-ranking cultivars in Table 2 have aggressive spreading growth habit to the point of encroachment upon adjacent plots of less persistent cultivars.

Table 1. Performance of Kentucky bluegrass cultivars under high management in southern Illinois[1].

Cultivar	Turf Quality Ratings[2]							Percent Stand[3]
	April	May	June	July	August	Sept.	Avg.	
Eagleton	6.3	9.0	6.7	8.3	7.3	4.7	7.1	45
Preakness	4.7	8.7	7.3	7.7	6.3	6.3	6.8	62
Shamrock	5.0	9.0	8.0	7.0	6.0	4.3	6.6	42
J-386	5.0	7.3	7.3	7.0	6.3	6.0	6.5	55
Barmax	6.7	8.0	8.3	7.3	6.0	2.3	6.4	20
NuStar	4.3	8.0	7.3	6.3	6.7	5.7	6.4	55
BAR VB 7037	6.0	7.7	7.3	7.7	5.7	4.0	6.4	27
Ba 69-82	5.0	8.7	6.3	6.7	5.0	6.5	6.4	41
1757	4.0	8.0	6.7	7.0	5.7	6.7	6.3	69
Kenblue	5.0	7.3	7.0	6.0	5.7	7.0	6.3	69
PST-A7-341	4.3	7.7	7.0	6.3	6.0	6.5	6.3	42
PST-UD-10	3.3	7.3	8.0	6.7	6.5	6.0	6.3	39
Monopoly	5.5	8.5	6.5	6.5	6.5	4.0	6.3	40
Estate	7.0	9.0	7.0	6.5	5.0	3.0	6.3	16
Fortuna	5.3	7.0	7.0	6.3	6.7	5.0	6.2	34
NuBlue	4.7	8.0	7.7	6.0	5.3	5.3	6.2	49
SR 2000	5.0	9.0	7.7	7.3	5.3	2.7	6.2	23
Glade	5.3	8.7	8.0	7.0	6.3	1.7	6.2	14
PSU-151	6.3	8.7	8.0	6.3	6.0	1.3	6.1	13
Allure	5.7	9.0	7.7	6.7	5.0	2.7	6.1	24
Coventry	6.0	8.0	7.3	6.7	5.0	3.7	6.1	38
Unique	4.0	7.0	5.7	7.3	6.3	6.3	6.1	64
Haga	5.7	9.0	7.3	6.7	5.7	2.3	6.1	23
Limousine	4.7	8.7	7.0	6.0	4.3	6.0	6.1	37
Midnight	5.0	8.3	8.3	7.3	6.0	1.5	6.1	10
4 Aces	4.3	7.7	6.0	7.3	5.3	5.7	6.1	54
J11-94	6.0	8.3	5.7	6.3	5.3	4.7	6.1	47
Princeton	4.7	8.7	7.7	7.0	5.3	3.0	6.1	29
Merit	4.3	6.3	7.0	6.5	6.0	6.0	6.0	59
Silvia	5.3	6.3	7.3	7.0	4.7	5.3	6.0	50
PST-A84-928	4.7	8.0	7.0	5.7	5.7	5.0	6.0	48
$LSD_{0.05}$	1.8	1.7	1.7	2.0	1.9	3.2	1.2	35

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

[3] Percent stand in recovery after drought during August.

Table 1. Performance of Kentucky bluegrass cultivars under high management in southern Illinois[1]. *(continued)*

Cultivar	Turf Quality Ratings[2]							Percent Stand[3]
	April	May	June	July	August	Sept.	Avg.	
Ronde	4.3	7.7	6.7	6.7	6.3	4.3	6.0	43
Barblue	4.0	8.0	6.5	7.0	5.5	5.0	6.0	48
Touchdown	5.0	8.7	8.0	6.7	4.3	3.3	6.0	34
PST-A7-1877	5.7	8.7	7.7	7.0	5.0	2.0	6.0	8
Indigo	3.3	7.7	7.3	6.5	5.0	6.0	6.0	60
Viva	4.3	7.7	6.3	6.3	5.7	5.3	5.9	50
PST-R-740	4.0	7.0	6.3	6.7	6.3	5.3	5.9	48
Conni	4.3	8.3	7.0	7.7	5.3	3.0	5.9	28
Trenton	5.0	8.3	7.0	6.0	5.3	4.0	5.9	37
PST-UD-12	4.3	7.7	7.0	6.7	4.0	6.0	5.9	38
Gnome	5.0	6.7	6.3	7.0	6.0	4.7	5.9	46
PST-1DW	4.7	8.7	8.3	7.3	5.3	1.0	5.9	8
Liberty	4.3	7.3	6.0	6.3	6.0	5.3	5.9	51
Washington	7.0	8.0	8.3	6.7	4.3	1.0	5.9	5
J-333	4.7	7.7	7.0	6.3	5.7	4.0	5.9	35
Barzan	4.7	8.3	7.7	6.3	5.0	3.0	5.8	18
Aspen	5.7	8.3	6.0	6.7	5.0	3.3	5.8	36
Chelsea	4.7	7.0	5.7	5.7	5.7	6.3	5.8	63
Abbey	5.7	7.0	6.7	6.7	6.0	3.0	5.8	28
Ram-1	7.0	9.0	9.0	6.0	3.0	1.0	5.8	5
Blacksburg	4.3	8.3	8.0	5.7	4.3	4.3	5.8	42
PST-0514	4.3	8.0	7.7	6.7	4.7	3.5	5.8	20
PST-B8-106	5.7	8.7	7.3	5.7	4.7	2.7	5.8	23
Marquis	5.3	7.0	6.3	6.0	6.3	3.7	5.8	35
Ba 77-292	5.7	7.0	6.3	6.0	6.0	3.5	5.8	24
PST-HV-116	5.7	8.0	6.7	6.3	4.7	3.0	5.7	19
Ba 77-700	4.7	8.0	7.3	6.3	5.3	2.7	5.7	26
Challenger	4.7	8.0	6.0	6.0	5.0	4.7	5.7	43
Ba 76-305	4.7	6.3	6.7	6.5	6.3	3.7	5.7	37
Ba 78-258	5.7	8.3	7.7	5.7	5.3	1.5	5.7	9
Cobalt	4.5	8.5	7.0	6.0	6.5	1.7	5.7	14
$LSD_{0.05}$	1.8	1.7	1.7	2.0	1.9	3.2	1.2	35

(continued)

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

[3]Percent stand in recovery after drought during August.

Table 1. Performance of Kentucky bluegrass cultivars under high management in southern Illinois[1]. *(continued)*

Cultivar	Turf Quality Ratings[2]							Percent Stand[3]
	April	May	June	July	August	Sept.	Avg.	
Livingston	4.7	8.3	7.0	7.0	5.7	1.5	5.7	9
Able I	5.0	8.0	8.0	7.3	4.7	1.0	5.7	12
Platini	5.3	8.7	7.0	6.3	3.7	3.0	5.7	21
Barcelona	3.7	8.0	7.3	6.3	6.0	2.5	5.6	15
Cardiff	6.3	7.7	8.0	6.7	3.7	1.5	5.6	9
BAR VB 895	5.7	8.0	5.7	6.7	5.7	2.0	5.6	17
A-34	6.3	8.3	7.3	6.0	4.0	1.7	5.6	15
Opal	5.0	7.7	6.7	6.7	5.3	2.3	5.6	21
Crest	4.3	7.3	6.7	6.0	6.0	3.3	5.6	33
Apex	4.3	8.3	7.7	7.0	4.7	1.5	5.6	12
R751A	4.0	6.7	6.0	6.0	5.3	5.5	5.6	36
EVB 13.863	4.0	7.7	7.7	6.3	5.7	2.0	5.6	20
PST-B8-13	3.7	7.3	5.7	6.7	5.3	4.7	5.6	46
Ba 73-381	4.3	8.0	6.3	5.5	4.3	4.7	5.5	43
Classic	5.0	7.3	7.0	6.0	5.0	2.3	5.4	23
Belmont	4.3	7.0	6.3	6.0	5.0	4.0	5.4	38
Banff	4.0	7.3	6.3	6.7	4.7	3.7	5.4	35
Trampas	4.7	7.7	7.7	6.3	4.3	2.0	5.4	7
PR-1	5.3	8.7	8.3	5.3	3.3	1.7	5.4	15
Bartitia	4.3	7.3	7.7	6.7	5.0	1.5	5.4	8
Georgetown	5.7	7.0	6.0	5.7	4.7	3.3	5.4	32
Ba 73-382	4.3	5.7	6.3	5.7	5.3	5.0	5.4	47
WW Ag 505	5.0	8.0	7.3	6.3	4.0	1.5	5.4	10
HV 125	3.7	7.3	6.7	5.5	4.3	4.7	5.4	47
Kelly	4.0	7.0	6.0	4.3	5.3	5.3	5.3	51
Cynthia	5.0	7.3	6.7	5.0	5.3	2.7	5.3	26
EVB 13.703	6.5	7.5	7.0	6.0	4.0	1.0	5.3	7
Ba 70.131	4.7	7.7	7.0	6.5	4.0	2.0	5.3	18
Eclipse	4.3	7.0	7.3	6.5	5.0	1.5	5.3	8
Julia	5.7	8.3	7.0	5.7	4.0	1.0	5.3	3
Barsweet	4.3	7.7	7.3	5.3	4.0	3.0	5.3	17
$LSD_{0.05}$	1.8	1.7	1.7	2.0	1.9	3.2	1.2	35

(continued)

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

[3]Percent stand in recovery after drought during August.

Table 1. Performance of Kentucky bluegrass cultivars under high management in southern Illinois[1]. *(continued)*

Cultivar	Turf Quality Ratings[2]							Percent
	April	May	June	July	August	Sept.	Avg.	Stand[3]
BAR VB 1169	6.0	7.7	6.7	4.7	3.7	3.0	5.3	21
Melba	5.0	7.7	5.7	6.7	4.3	2.0	5.2	15
Merion	5.0	7.3	7.0	5.3	5.0	1.7	5.2	15
S. Dakota Cert.	3.0	5.7	4.7	5.7	5.0	7.0	5.2	71
Freedom	5.0	7.0	6.3	6.0	4.0	2.7	5.2	26
PST-C-224	5.3	7.7	7.0	4.7	3.7	2.5	5.1	16
PST-A84-928	3.7	7.3	5.7	6.7	5.0	2.3	5.1	21
SR 2100	3.3	7.7	6.3	5.3	4.3	3.7	5.1	38
Baron	4.3	6.0	6.3	6.0	3.7	4.3	5.1	42
Suffolk	5.0	6.7	5.7	4.0	4.0	5.3	5.1	51
PST-A84-405	4.7	6.7	6.0	6.5	4.7	2.0	5.1	20
Nassau	5.3	6.7	5.0	5.3	4.0	3.7	5.0	32
KWS Pp 13-2	4.3	6.3	5.7	5.0	5.0	3.7	5.0	37
Dawn	5.3	7.0	5.7	5.3	4.3	2.3	5.0	23
Minstrel	3.3	8.0	7.3	6.3	3.0	1.7	4.9	15
Noblesse	3.7	6.7	5.7	6.0	4.3	3.0	4.9	28
J-335	5.7	7.3	5.7	4.3	4.3	2.0	4.9	17
J13-152	4.3	7.0	6.0	5.3	4.3	2.0	4.8	11
Alpine	3.7	8.0	7.0	4.3	2.7	3.0	4.8	19
Ampellia	4.0	7.3	6.3	5.0	4.0	2.0	4.8	18
Broadway	4.5	7.0	6.0	4.0	4.5	2.5	4.8	24
Miranda	3.7	7.0	6.7	5.0	4.0	2.0	4.7	13
Ba 77-279	3.7	7.7	6.7	5.3	3.3	1.0	4.6	7
WW Ag 508	2.7	6.5	6.5	6.0	3.7	2.0	4.6	12
J34-99	4.3	6.0	6.0	4.7	4.3	2.0	4.6	17
Donna	4.0	6.7	6.3	5.7	3.0	1.7	4.6	14
Miracle	4.5	5.5	6.5	6.0	2.7	2.0	4.5	14
NE 80-47	5.0	7.0	4.3	4.3	4.0	2.3	4.5	22
Greenley	4.7	5.3	5.0	5.0	5.0	2.0	4.5	19
Buckingham	3.7	6.0	5.0	6.0	3.0	2.3	4.3	22
Ginger	1.7	5.0	4.3	5.3	4.0	4.3	4.1	42
Destiny	4.0	6.0	6.0	4.5	3.0	1.0	4.1	12
$LSD_{0.05}$	1.8	1.7	1.7	2.0	1.9	3.2	1.2	35

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

[3] Percent stand in recovery after drought during August.

Table 2. Performance of Kentucky bluegrass cultivars under low management in southern Illinois[1].

Cultivar	Turf Quality Ratings[2]						
	April	May	June	July	August	Sept.	Avg.
NuBlue	3.3	8.3	7.0	7.0	5.5	5.0	6.0
Barmax	3.3	8.3	7.0	8.0	5.5	4.0	6.0
ZPS 84-749	3.0	8.3	6.0	8.5	6.7	3.3	6.0
J-386	3.0	7.3	8.5	7.0	5.5	4.0	5.9
Midnight	2.7	6.3	7.0	8.0	6.3	4.3	5.8
Voyager	3.7	8.0	6.3	6.7	5.7	4.3	5.8
Cobalt	3.0	8.3	6.3	6.7	6.3	3.7	5.7
EVB 13.703	3.0	7.7	8.0	6.0	5.7	3.7	5.7
PST-A7-111	3.7	8.7	6.7	6.7	5.0	2.7	5.6
PST-YQ	2.7	7.7	5.0	7.0	6.5	4.3	5.5
Chelsea	3.3	7.7	6.3	6.3	5.7	3.7	5.5
Sophia	3.3	8.7	6.7	6.3	5.0	3.0	5.5
Belmont	3.0	7.7	8.0	5.5	5.0	3.3	5.4
KWS Pp 13-2	3.0	7.7	7.3	5.0	5.0	4.3	5.4
Unique	3.0	8.0	6.7	6.0	5.7	3.0	5.4
GEN-RSP	4.7	8.7	5.0	6.0	4.3	3.7	5.4
Opal	2.0	7.3	8.0	7.5	5.0	2.3	5.4
Merion	3.3	7.3	5.0	7.0	5.3	4.0	5.3
ISI-21	3.3	8.0	4.0	7.0	5.0	4.7	5.3
Gnome	2.3	6.7	6.3	6.0	5.7	5.0	5.3
J-335	3.3	7.7	7.3	5.7	5.0	2.7	5.3
Banjo	2.3	6.0	6.0	7.0	5.3	5.0	5.3
NE 80-47	3.0	7.0	7.0	6.0	4.7	4.0	5.3
Kenblue	3.3	8.0	6.7	6.0	4.7	3.0	5.3
Merit	2.0	6.0	6.5	6.0	5.0	6.0	5.3
Cynthia	2.0	7.3	9.0	5.0	3.3	4.7	5.2
BAR VB 1169	2.3	7.0	6.0	5.5	5.5	5.0	5.2
NuStar	2.3	8.0	7.0	6.3	4.7	3.0	5.2
Bronco	2.0	7.0	6.7	6.7	5.0	4.0	5.2
Washington	3.0	7.3	6.0	7.0	5.3	2.7	5.2
Haga	2.0	7.3	6.0	6.0	5.5	4.3	5.2
$LSD_{0.05}$	1.4	1.4	1.8	1.0	1.2	2.9	0.3

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

Table 2. Performance of Kentucky bluegrass cultivars under low management in southern Illinois[1]. *(continued)*

Cultivar	Turf Quality Ratings[2]						
	April	May	June	July	August	Sept.	Avg.
Destiny	2.7	6.7	8.0	5.0	3.5	5.3	5.2
Crest	2.7	6.7	6.0	6.7	6.0	3.0	5.2
Liberty	2.7	7.7	6.7	5.5	5.3	3.0	5.1
Alene	2.3	6.7	5.3	6.0	5.5	5.0	5.1
Miracle	3.0	5.7	7.0	5.3	5.3	4.3	5.1
PST-C-303	2.0	7.0	6.0	6.0	5.0	4.7	5.1
Bartitia	2.0	6.7	7.0	6.0	5.0	3.7	5.1
Unknown	2.3	6.3	6.5	5.0	5.0	5.0	5.0
Livingston	2.7	6.7	6.7	6.0	4.5	3.7	5.0
MN 2405	3.0	6.7	6.3	5.7	4.7	3.3	4.9
BAR VB 895	3.0	6.7	7.0	5.0	4.0	4.0	4.9
Baron	3.0	6.7	6.5	5.5	5.0	3.0	4.9
Kyosti	1.3	6.7	5.7	6.0	5.0	5.0	4.9
PST-C-391	3.3	8.0	6.7	4.5	4.0	3.0	4.9
NJIC	2.3	6.7	7.0	5.0	3.5	5.0	4.9
Ram-1	2.0	5.7	5.7	7.0	5.0	4.0	4.9
Barsweet	3.0	9.0	6.3	4.3	4.3	2.3	4.9
Fortuna	3.0	6.7	6.7	5.0	5.0	3.0	4.9
Barzan	2.3	7.0	6.5	5.0	4.0	4.3	4.9
SR 2000	2.0	6.0	6.7	6.0	5.0	3.3	4.8
Suffolk	3.7	8.3	6.3	4.7	3.7	2.3	4.8
BAR VB 7037	3.0	6.0	6.0	5.0	5.0	3.7	4.8
Freedom	2.7	6.7	7.0	5.0	3.3	3.0	4.6
S. Dakota Cert.	2.3	5.0	6.7	4.0	4.3	5.0	4.6
Ba 74-017	2.7	6.3	6.7	3.5	4.3	3.7	4.5
Monopoly	1.7	7.0	4.5	5.0	4.0	5.0	4.5
Barcelona	1.7	5.3	4.7	5.0	4.5	4.7	4.3
Amazon	2.7	7.3	5.3	3.5	3.0	3.7	4.3
EVB 13.863	1.3	6.3	6.0	4.0	3.5	4.0	4.2
Ba 78-376	3.3	6.7	5.0	4.7	2.7	2.3	4.1
Park	3.7	6.3	5.3	3.7	3.3	2.0	4.1
$LSD_{0.05}$	1.4	1.4	1.8	1.0	1.2	2.9	0.3

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turfgrass quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

USDA National Perennial Ryegrass Cultivar Evaluation

K.L. Diesburg

Research Protocol:	**Perennial Ryegrass Cultivar Evaluation**
Location:	Southern Illinois University, Carbondale, IL.
Site Preparation:	Hosmer silt clay loam.
Seeding/ Establishment:	date seeded - September 20, 1990; seeding rate - 6 lbs/M; plot size - 4 ft x 5 ft.
Plot Maintenance:	mowing height - 1.5 inches; pesticides - Ronstar in April, Dacthal in June, Turflon D in April and November; fertilization - 4 lbs N/M/yr (UF and SCU).
Experimental Design:	RCB; 3 replications.

Perennial ryegrass has come a long way since 1961 when NK-100 was released as the first cultivar specifically for turf. The USDA initiated a national evaluation program of 47 entries in 1982. During the ensuing four years, there were enough releases of new cultivars to warrant the testing of a second set containing 65 entries in 1986. In 1990, an even larger set with 123 entries was organized and distributed for national testing. Perennial ryegrass does not persist well in the transition zone, but it is used extensively in mixes as a nurse species for the slower establishing tall fescue and zoysiagrass. It is also used in pure stand as a specialty grass in golf course tees and collars, or in any higher management situation where a high-quality cover is needed quickly.

The differences among perennial ryegrass cultivars are subtle when moisture, temperature, and nutrients are optimum and no pests are present. Differences occur in shade of green, texture, and density. Irrigation was not applied this year as in previous years, in order to determine cultivar tolerance to heat and moisture stress as well as degree of recovery after dormancy due to the heat and drought stress. Turfgrass quality during July and August indicate stress tolerance (reflected in average turfgrass quality). Turfgrass quality in September indicates the degree of recovery (not shown). Indications of spring and fall growth rate are shown Canopy Height in Table 3. Tolerance to Brown Patch is also shown in Table 3.

Table 3. NTEP Perennial Ryegrass Cultivar Trial.[1]

Cultivar	Turf Quality[2] May	Turf Quality[2] Avg.	Brown Patch July	Canopy Height (cm) May	Canopy Height (cm) Dec	Canopy Height (cm) Avg.	% Stand[3] Sept
PST-28M	9.0	7.8	10	9.3	5.8	7.6	33
Seville	8.5	7.7	33	9.0	5.8	7.4	33
Prism	9.0	7.5	30	8.3	5.7	7.0	35
Assure	9.0	7.4	20	9.0	5.8	7.4	24
Cutter	9.0	7.4	38	8.3	6.3	7.3	34
4DD-Del. Dwarf	8.3	7.4	26	9.7	6.3	8.0	53
Pick DKM	8.0	7.4	26	10.3	5.8	8.1	49
Achiever	8.7	7.3	42	11.0	6.0	8.5	43
Pinnacle	8.7	7.3	31	9.0	6.5	7.8	23
Express	8.0	7.2	23	11.0	6.0	8.5	43
Affinity	8.7	7.1	26	10.0	6.0	8.0	40
Mom Lp 3147	8.3	7.1	21	9.3	6.7	8.0	19
PST-23C	8.7	7.1	24	10.0	6.2	8.1	20
Morning Star	8.3	7.0	30	10.3	6.3	8.3	32
APM	9.0	6.9	41	8.3	6.2	7.3	20
NightHawk	8.3	6.9	28	10.7	5.7	8.2	25
Brightstar	9.0	6.9	21	8.0	5.3	6.7	25
Advent	9.0	6.9	38	9.3	7.0	8.2	37
Legacy	8.7	6.9	39	10.0	6.2	8.1	24
Pick-EEC	7.3	6.9	23	9.7	6.3	8.0	31
Pick-9100	8.3	6.8	14	11.0	6.2	8.6	35
PST-2ROR	8.3	6.8	17	9.3	7.3	8.3	15
Quickstart	8.3	6.8	42	10.0	6.2	8.1	26
Pleasure	7.3	6.8	40	11.0	7.2	9.1	41
Prelude II	8.0	6.7	23	8.3	6.2	7.3	21
Sherwood	8.0	6.7	30	10.0	6.5	8.3	19
89-666	7.3	6.7	12	10.7	7.0	8.8	21
Gettysburg	8.7	6.7	24	9.0	6.7	7.8	20
Dimension	8.3	6.6	28	10.7	7.8	9.3	14
PST-2FF	7.7	6.6	24	11.0	6.7	8.8	24
Envy	7.7	6.5	23	10.3	7.3	8.8	17
Palmer II	8.3	6.5	46	7.7	5.8	6.8	22
PST-2OG	8.3	6.5	30	10.0	6.7	8.3	27
OFI-F7	8.0	6.5	73	8.7	6.0	7.3	56
Navajo	7.7	6.4	73	8.7	5.5	7.1	34
Koos 90-2	7.7	6.4	69	8.7	7.2	7.9	39
Dandy	7.3	6.4	21	10.7	6.7	8.7	22
Buccaneer	7.0	6.4	48	11.3	6.3	8.8	35
WVPB-89-87A	7.7	6.3	45	10.7	6.3	8.5	39
Stallion Sel.	8.0	6.2	53	8.7	6.5	7.6	26
Repell II	7.0	6.2	25	9.3	6.7	8.0	35

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3] Percent area of plot covered with turf.

Table 3. NTEP Perennial Ryegrass Cultivar Trial.[1] *(continued)*

Cultivar	Turf Quality[2] May	Turf Quality[2] Avg.	Brown Patch July	Canopy Height (cm) May	Canopy Height (cm) Dec	Canopy Height (cm) Avg.	% Stand[3] Sept
PST-2B3	7.0	6.2	26	12.7	6.7	9.7	21
Riviera	7.0	6.2	42	11.3	8.0	9.7	23
Essence	7.3	6.2	55	11.0	6.7	8.8	22
Elite	7.0	6.2	34	12.5	7.0	9.8	44
Yorktown III	8.0	6.2	32	9.0	6.8	7.9	23
CitationII	6.3	6.2	24	13.3	7.0	10.2	33
SR 4200	8.0	6.2	52	35.7	6.2	20.9	22
Fiesta II	7.3	6.2	43	11.3	7.3	9.3	21
PST-290	6.7	6.1	17	11.3	6.0	8.7	31
Manhattan II	7.3	6.1	55	9.0	6.3	7.7	24
Competitor	7.3	6.1	49	9.3	6.5	7.9	29
PR 9119	7.3	6.1	57	11.7	7.2	9.4	37
Mom Lp 3184	6.7	6.0	21	12.7	7.0	9.8	34
WVPB 89-92	6.3	6.0	48	10.3	7.7	9.0	22
Statesman	7.0	5.8	40	12.3	6.5	9.4	16
ZPS-2EZ	5.5	5.8	35	10.5	7.0	8.8	30
Equal	7.3	5.8	16	10.0	6.5	8.3	20
PR 9121	7.3	5.8	30	11.0	7.3	9.2	19
Derby Supreme	6.7	5.8	43	14.3	8.8	11.6	35
Regal	6.0	5.8	80	17.0	7.0	12.0	47
Duet	6.0	5.7	60	12.7	8.8	10.8	27
Saturn	6.7	5.7	34	11.3	7.0	9.2	28
N-33	7.7	5.7	35	13.0	8.3	10.7	18
Pebble Beach	6.0	5.6	45	12.3	7.2	9.8	20
Premier	6.3	5.6	38	15.3	7.2	11.3	28
Mom Lp 3185	6.7	5.6	38	12.3	8.0	10.2	18
Barrage ++	7.0	5.6	72	9.7	6.5	8.1	52
Calypso	6.7	5.6	24	15.0	7.5	11.3	24
BAR Lp 852	7.0	5.6	45	13.0	6.5	9.8	27
Charger	6.7	5.6	55	11.0	7.3	9.2	26
Lowgrow	7.3	5.6	73	8.0	6.5	7.3	19
MVF 89-90	7.0	5.6	48	9.7	6.7	8.2	28
Lindsay	7.0	5.6	42	12.7	7.3	10.0	22
Target	7.3	5.5	44	10.3	7.5	8.9	29
MVF 89-88	7.3	5.5	51	10.3	7.0	8.7	19
Repell	7.7	5.4	55	8.7	6.3	7.5	32
PR 9109	6.7	5.4	55	11.7	7.5	9.6	25
Topeka	6.3	5.3	50	13.0	5.8	9.4	29
Mulligan	6.7	5.3	35	12.3	7.7	10.0	20
Stallion	5.7	5.3	40	14.0	6.5	10.3	23
Barrage	5.7	5.2	52	10.3	7.7	9.0	30

(continued)

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3]Percent area of plot covered with turf.

Table 3. NTEP Perennial Ryegrass Cultivar Trial.[1] *(continued)*

Cultivar	Turf Quality[2] May	Turf Quality[2] Avg.	Brown Patch July	Canopy Height (cm) May	Canopy Height (cm) Dec	Canopy Height (cm) Avg.	% Stand[3] Sept
Cowboy II	6.7	5.2	43	10.7	7.3	9.0	16
Caliente	5.0	5.2	32	14.3	7.3	10.8	25
Patriot II	7.3	5.2	57	12.0	6.5	9.3	10
Rodeo II	6.5	5.2	68	11.0	7.5	9.3	45
ZW 42-176	6.5	5.2	53	12.0	7.8	9.9	21
Gator	6.7	5.1	46	11.7	6.5	9.1	21
BAR Lp 086FL	5.3	5.1	86	10.7	7.8	9.3	16
PR 9108	6.3	4.9	50	14.0	7.5	10.8	25
Commander	5.7	4.9	45	13.0	7.5	10.3	19
HE 311	6.0	4.9	62	7.7	5.7	6.7	19
Nomad	6.7	4.9	70	10.0	6.5	8.3	31
Pennant	6.0	4.9	25	13.3	7.0	10.2	13
Accolade	5.0	4.8	85	14.3	6.7	10.5	22
PR 9118	7.0	4.8	87	9.3	7.2	8.3	29
C-21	4.7	4.8	50	11.3	8.8	10.1	32
Mom Lp 3182	5.0	4.8	43	10.7	8.3	9.5	15
Danilo	7.0	4.8	78	11.7	7.3	9.5	12
Cutless	6.3	4.8	50	10.7	7.8	9.3	23
EEG 358	5.3	4.8	68	8.3	8.5	8.4	17
856	6.0	4.7	46	13.3	8.2	10.8	19
Unknown	6.3	4.7	87	10.7	6.3	8.5	43
Meteor	7.0	4.7	55	9.0	7.8	8.4	15
OFI-D4	6.7	4.7	48	14.0	8.2	11.1	15
Taya	6.0	4.4	60	8.7	7.8	8.3	19
CLP 39	6.0	4.4	90	10.0	7.5	8.8	16
Allegro	6.0	4.3	96	10.0	7.0	8.5	22
Mom Lp 3179	5.3	4.1	60	14.7	8.2	11.4	20
Entrar	5.3	4.1	80	9.3	8.7	9.0	12
CLP 144	5.0	4.1	60	9.3	6.7	8.0	34
Evening Shade	5.7	3.8	87	8.0	6.0	7.0	23
Cartel	5.0	3.7	88	11.3	8.5	9.9	12
Mom Lp 3111	5.0	3.7	82	14.3	7.7	11.0	12
Ovation	4.0	3.6	65	13.3	8.2	10.8	29
Danaro	4.7	3.6	58	11.7	6.8	9.3	14
Toronto	4.0	3.4	83	11.7	8.5	10.1	18
Pennfine	4.7	3.3	61	15.0	7.3	11.2	9
Loretta	3.3	3.3	80	10.0	8.3	9.2	30
Goalie	4.7	3.1	90	11.0	7.0	9.0	17
Surprise	4.3	2.9	87	11.3	8.2	9.8	13
Troubadour	3.3	2.5	82	10.7	9.2	9.9	9
Linn	1.0	1.3	82	23.0	9.8	16.4	11
$LSD_{0.05}$	1.9	1.1	32	7.1	1.5	3.6	24

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3]Percent area of plot covered with turf.

NTEP Tall Fescue Cultivar Trial

K.L. Diesburg

Research Protocol:	**Tall Fescue Cultivar Trial**
Location:	Southern Illinois University, Carbondale, IL.
Site:	Hosmer silt clay loam.
Plot Maintenance:	mowing height - 2.25 inches; pesticides - preemergent, Ronstar in April and Barricade in June; postemergent, Turflon D in March; irrigation - none; fertilization - 4 lb N/M/yr, SCU, Nitroform and Nutralene.
Experimental Design:	RCB; 3 replications.

Tall fescue is the dominant turfgrass species in southern Illinois. The combination of prolonged hot summer, poor soil, and periodic drought make the environment too harsh for Kentucky bluegrass in non-irrigated areas. Tall fescue becomes the cool-season species of choice. There has been a proliferation of tall fescue cultivars with the advent of the turf-type material. The most recent assemblage of cultivars from the USDA was planted at selected sites across the country in 1992. Among them is the first tall fescue cultivar developed from the turfgrass breeding program at Southern Illinois University, SIU-1. This was an excellent test of tolerance to Brown Patch in the first year after establishment. Tolerance to Brown Patch is the major factor influencing turfgrass quality ratings. Cultivars that otherwise have great color and density never did get ahead of the disease.

Table 4. Performance of tall fescue cultivars.[1]

Cultivar	Turf Quality[2]						Color[4]	Canopy Height (cm)	Brown Patch[3] (%)
	April	May	June	July	Aug	Avg			
ZPS-ML	6.7	8.0	8.0	8.0	6.7	7.5	9.0	12.0	14
Cochise	6.0	8.0	8.0	7.7	6.0	7.1	7.3	13.0	14
SR 8200	6.3	7.0	7.7	7.7	6.0	6.9	8.0	12.7	14
403	6.3	7.0	7.3	8.0	6.0	6.9	7.0	14.7	18
Gen-91	5.7	7.0	7.7	7.3	6.3	6.8	7.3	9.3	21
SIU-1	6.0	6.7	7.3	7.7	6.3	6.8	6.0	10.0	16
PST-RDG	6.0	6.7	8.0	6.7	6.0	6.7	8.3	10.3	40
MB-25-92	6.7	7.3	7.0	7.0	5.3	6.7	8.7	11.3	28
Rebel Jr.	5.7	7.3	7.3	6.3	6.7	6.7	7.0	10.0	49
Pick 90-12	5.7	7.0	7.3	7.7	5.7	6.7	7.7	11.3	22
SR 8400	4.7	7.0	7.0	7.0	7.3	6.6	6.0	9.7	8
M-2	5.3	5.7	7.7	7.3	7.0	6.6	5.7	11.0	15
Cafa101	5.7	6.3	6.7	7.3	7.0	6.6	4.7	11.3	17
ZPS-J3	5.7	6.7	7.0	7.7	6.0	6.6	6.3	11.7	17
Safari	5.3	6.7	6.3	7.3	7.0	6.5	5.0	11.7	20
SR 8300	6.0	7.0	6.3	7.7	5.7	6.5	7.0	13.7	19
ZPS-E2	6.0	6.0	6.7	8.3	5.7	6.5	7.7	10.7	11
FA-22	5.7	6.7	7.3	6.7	6.3	6.5	6.0	10.3	37
Tomahawk	6.0	7.0	7.0	6.0	6.7	6.5	7.3	10.7	36
Avanti	5.3	6.0	7.0	8.0	6.0	6.5	6.0	11.7	8
Pixie	6.0	6.7	7.3	7.0	5.3	6.5	7.3	10.0	24
Shenandoah	5.3	7.0	7.3	6.3	6.3	6.5	5.7	10.7	37
Eldorado	6.0	7.0	6.7	7.0	5.7	6.5	6.7	10.3	23
ZPS-VL	6.0	7.7	7.3	7.0	4.3	6.5	7.7	9.3	20
SR 8010	5.0	6.7	7.3	7.0	6.3	6.5	4.7	11.0	22
ATF-006	6.3	7.7	8.3	6.0	4.0	6.5	8.0	9.7	43
Rebel-3D	5.7	7.0	6.7	6.7	6.3	6.5	7.3	10.3	32
Pick 90-6	6.0	7.0	7.3	6.7	5.0	6.4	8.0	11.3	31
Leprechaun	5.0	6.7	7.7	7.3	5.3	6.4	6.7	9.0	41
PRO-9178	5.3	7.0	6.7	6.7	6.3	6.4	6.3	10.0	29
Pick CII	5.7	7.0	7.3	6.3	5.3	6.3	7.7	11.7	27
KWS-DSL	6.0	6.3	7.0	6.7	5.7	6.3	7.0	12.3	34
$LSD_{0.05}$	1.8	1.8	1.6	2.3	1.8	1.2	1.5	4.1	37

(continued)

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3]Percent of plot showing symptoms of brown patch.

[4]Color is base on a 1-9 scale where 1 = very poor turfgrass quality and 9 = excellent turfgrass quality.

Table 4. Performance of tall fescue cultivars.[1] *(continued)*

Cultivar	Turf Quality[2]						Color[4]	Canopy Height (cm)	Brown Patch[3] (%)
	April	May	June	July	Aug	Avg			
Micro DD	4.7	7.0	7.0	7.0	5.7	6.3	7.3	8.7	31
ISI-CRC	6.0	5.7	8.0	7.0	4.7	6.3	5.7	15.0	19
Finelawn 88	5.3	7.0	6.7	7.0	5.0	6.2	7.3	14.7	27
FA-19	5.0	6.7	7.3	6.0	6.0	6.2	6.3	9.7	50
Excalibur	4.7	6.0	6.7	7.0	6.7	6.2	5.7	10.3	14
Petite	5.3	6.7	7.0	6.0	6.0	6.2	7.3	9.0	39
Austin	5.0	5.7	6.7	7.3	6.0	6.1	4.7	12.0	16
ISI-AFE	5.3	7.0	7.0	6.3	5.0	6.1	7.0	10.3	22
MB-23-92	5.0	6.7	7.0	6.7	5.3	6.1	6.7	8.0	29
PST-5LX	5.3	6.0	6.7	7.3	5.3	6.1	8.3	9.3	7
PSTF-LF	5.7	6.3	6.7	7.0	5.0	6.1	6.0	13.0	25
Guardian	5.3	6.3	7.0	7.0	5.0	6.1	6.7	11.7	14
BAR Fa 0855	5.3	6.0	6.0	7.3	5.7	6.1	5.3	10.3	15
Bonanza	5.0	6.0	6.7	6.7	6.0	6.1	5.3	11.0	22
Trailblazer II	5.7	6.7	6.7	6.0	5.3	6.1	6.7	9.3	43
Lancer	6.0	6.3	7.3	6.3	4.3	6.1	8.3	12.0	42
MB-21-92	5.3	6.7	6.7	5.7	5.7	6.0	6.7	9.3	48
BAR Fa 2AB	5.7	6.7	6.3	6.0	5.3	6.0	7.3	9.7	40
OFI-TF-601	4.7	5.7	6.3	7.7	5.7	6.0	5.0	9.7	17
Vegas	4.3	6.0	6.3	7.3	6.0	6.0	7.7	9.3	24
Montank	5.3	6.3	6.7	7.3	4.3	6.0	5.7	11.0	15
PSTF-4-1	5.3	6.3	6.7	7.0	4.7	6.0	4.3	11.3	28
QS-ST2	4.3	5.7	6.3	7.0	6.3	5.9	6.3	10.3	26
Virtue	4.3	6.7	6.3	6.3	6.0	5.9	6.7	9.3	28
PSTF-200	4.7	6.3	6.3	6.3	6.0	5.9	5.3	11.3	37
ISI-ATK	4.7	5.7	6.3	7.0	6.0	5.9	4.7	10.0	36
Kittyhawk	5.0	6.0	6.3	6.7	5.7	5.9	5.7	11.7	33
ISI-AFA	5.3	6.3	6.0	6.3	5.7	5.9	7.0	10.0	38
ITR-90-2	5.0	6.0	6.3	6.3	5.7	5.9	6.7	7.7	34
J-1048	4.3	5.7	6.3	6.7	6.3	5.9	6.3	10.3	8
PST-5DX w/endo	5.0	6.3	6.7	6.0	5.3	5.9	7.0	10.3	34
Silverado	4.7	6.0	6.3	6.7	5.7	5.9	6.3	7.7	37
$LSD_{0.05}$	1.8	1.8	1.6	2.3	1.8	1.2	1.5	4.1	37

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3] Percent of plot showing symptoms of brown patch.

[4] Color is base on a 1-9 scale where 1 = very poor turfgrass quality and 9 = excellent turfgrass quality.

Table 4. Performance of tall fescue cultivars.[1] *(continued)*

Cultivar	Turf Quality[2]						Color[4]	Canopy Height (cm)	Brown Patch[3] (%)
	April	May	June	July	Aug	Avg			
Cambridge	4.7	5.7	6.7	6.3	6.0	5.9	5.3	10.3	24
CAS-LA20	5.0	6.3	6.3	6.0	5.7	5.9	6.3	10.7	38
Olympic II	4.7	4.7	6.3	7.0	6.7	5.9	4.0	11.7	20
PST-5STB	4.7	6.3	6.7	7.3	4.3	5.9	7.7	11.3	7
CAS-MA21	5.0	6.3	7.0	6.3	4.3	5.8	5.3	11.3	24
WXI-208-2	4.3	5.7	6.3	7.7	5.0	5.8	7.0	11.0	15
Bonanza II	5.0	6.3	6.3	5.3	6.0	5.8	5.7	13.0	18
Lexus	5.3	5.0	6.3	6.7	5.7	5.8	7.7	8.0	33
Duke	4.7	6.0	6.0	6.7	5.7	5.8	5.7	9.3	34
Phoenix	4.3	5.3	6.3	6.7	6.3	5.8	4.3	12.3	28
PST-59D	4.7	5.7	6.0	6.7	6.0	5.8	8.3	12.3	27
MB-24-92	4.3	5.7	5.7	6.3	6.3	5.7	7.7	8.0	33
Astro 2000	5.0	5.0	6.3	6.0	6.0	5.7	5.0	12.7	19
Minx	5.0	5.0	6.3	5.7	6.3	5.7	6.3	12.7	38
Monarch	4.7	5.3	5.7	6.7	5.7	5.6	5.7	10.0	35
MB-22-92	4.7	6.3	6.0	4.7	6.0	5.5	7.0	8.0	59
BAR Fa 214	5.3	6.3	5.7	6.3	4.0	5.5	5.3	10.7	35
ATF-007	4.7	5.3	6.0	5.7	6.0	5.5	6.7	6.7	43
Bonsai Plus	4.3	4.7	6.3	6.3	5.7	5.5	6.3	7.3	30
Pick 90-10	4.3	5.7	6.0	5.7	5.7	5.5	8.3	7.7	50
SFL	4.3	5.7	6.0	7.0	4.3	5.5	7.3	11.7	16
Falcon	4.7	4.3	6.3	6.3	5.7	5.5	3.7	14.0	31
PDT-5PM	5.3	5.3	5.7	5.3	5.7	5.5	7.0	9.0	60
Twilight	5.3	5.0	5.7	6.0	5.0	5.4	9.0	10.7	30
Arid	4.3	5.0	4.7	6.3	6.0	5.3	3.7	16.7	7
PST-5VC	5.7	6.3	6.0	5.0	3.3	5.3	5.7	8.3	42
SR 8210	4.3	5.0	5.7	6.0	5.0	5.2	5.7	7.7	34
QS-RH2	4.7	5.0	5.3	5.0	4.3	4.9	6.7	6.7	22
Anthem	3.7	4.7	5.3	6.0	4.0	4.7	3.0	16.3	11
Bonsai	4.0	4.0	5.3	5.3	5.0	4.7	6.3	5.0	28
Ky-31 w/endo	3.0	4.0	6.0	4.7	5.3	4.6	2.7	14.3	38
Ky-31	3.3	3.3	4.7	5.0	5.7	4.4	2.7	14.0	26
Aztec	2.0	1.0	1.7	2.7	3.3	2.1	1.3	20.7	22
$LSD_{0.05}$	1.8	1.8	1.6	2.3	1.8	1.2	1.5	4.1	37

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3]Percent of plot showing symptoms of brown patch.

[4]Color is base on a 1-9 scale where 1 = very poor turfgrass quality and 9 = excellent turfgrass quality.

NTEP Fine Fescue Cultivar Trial

K.L. Diesburg

Research Protocol:	**NTEP Fine Fescue Cultivar Trial**
Location:	Southern Illinois University; Carbondale, IL.
Site:	Hosmer silty clay loam; most droughthy sunny area in the trials.
Plot Maintenance:	mowing heights - 1.50 and 2.25 inches; pesticides - preemergent, Ronstar (April); postemergent, MCPP & 2,4-D (March) and Turflon D (October); irrigation - every other day 1990, none 1991 through 1993; fertilization - 4 lb N/M/yr, SCU and Nitroform.
Experimental Design:	Strip-plot Design; 3 replications.

The previous USDA fine fescue trial sent out in 1983 had 47 entries. This one has 92. This gives you an indication of the proliferation of cultivars in these species. The fine fescues are suited to very specific niches in the turfgrass environment. They can take a great deal of drought as long as it is not sunny. Thus they persist in southern Illinois within the drip-line areas of larger trees. They do not survive well on the north sides of buildings, here, as they do in upstate Illinois because moisture always lingers after rain. Moisture plus the high heat and humidity in southern Illinois stimulate rampant pathogen activity on these species.

The cultivars within the top LSD (Least Significant Difference) in the tables are those that have persisted through disease, heat, and moisture stress since starting in 1990. This trial will was destroyed toward the end of 1993 to make room for the next set of fine fescue cultivars coming from the NTEP. The 1.5-inch clipping height was imposed to determine if any cultivars could persist better at that height rather than the 2.25-inch clip. A few were able to, but most did better at the high clip. There are distinct differences among cultivars and species within the fine fescue group regarding summer stress tolerance. Without a doubt, the proper choice of cultivar will make the difference in success and failure with a fine fescue turf in southern Illinois.

Table 5. Fine fescue cultivar performance under high mowing height, 2.25 inches.[1]

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
Longfellow	7.0	6.7	7.7	7.0	7.1
Bridgeport	5.7	7.0	8.0	6.7	6.8
Jamestown II	5.7	6.7	7.7	7.3	6.8
Herald	5.7	5.3	8.0	8.0	6.8
PST-4R3	5.7	5.7	7.7	7.0	6.5
Biljart	6.3	5.7	7.0	5.7	6.2
SR 3100	6.3	5.3	6.7	6.3	6.2
Banner	4.7	6.0	7.7	6.0	6.1
Epsom	6.3	6.0	7.0	5.0	6.1
WW Rs 143	5.7	4.7	7.3	6.7	6.1
Bargena II	5.7	5.7	7.0	6.0	6.1
Bargena	5.3	5.3	7.0	6.3	6.0
PST-4NI	5.0	5.7	7.0	6.3	6.0
PST-4C8	5.3	5.3	7.3	6.0	6.0
Shademaster	6.3	6.0	6.0	5.3	5.9
Southport	5.3	6.7	6.7	4.3	5.8
SR 5000	5.7	5.7	5.3	6.0	5.7
PST-43F	4.7	5.7	7.0	5.3	5.7
Cindy	5.3	5.3	6.7	5.3	5.7
Ensylva	5.3	4.3	7.0	6.0	5.7
Jasper	5.0	5.3	6.7	5.3	5.6
HF 138	5.0	5.0	6.7	5.7	5.6
Aurora	5.0	5.0	7.3	5.0	5.6
Salem	5.3	4.7	6.0	6.3	5.6
Enjoy	5.0	5.7	6.0	5.3	5.5
Vista	6.0	6.0	6.0	4.0	5.5
Jamestown	5.0	4.7	6.3	6.0	5.5
Collo	4.7	5.0	6.7	5.7	5.5
Sunset	5.3	4.3	6.3	6.0	5.5
Scarlet	5.0	5.3	6.7	5.0	5.5
PST-4AG	6.0	5.7	5.7	4.3	5.4
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 5. Fine fescue cultivar performance under high mowing height, 2.25 inches.[1] *(continued)*

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
Flyer	5.0	5.3	5.3	5.7	5.3
Smirna	4.7	4.0	6.7	6.0	5.3
Brigade	5.7	6.3	6.0	3.0	5.3
Reliant w/endo	6.0	5.3	5.3	4.3	5.3
SR 3000	5.7	5.0	5.7	4.7	5.3
Tiffany	6.3	5.7	5.3	3.3	5.2
Proformer	5.0	5.3	6.0	4.3	5.2
Revere	4.7	4.7	6.0	5.0	5.1
Claudia	6.0	4.3	5.7	4.0	5.0
Belvedere	4.0	3.3	7.3	5.3	5.0
Attila	4.3	5.3	5.7	4.7	5.0
Boreal	5.0	4.0	6.3	4.3	4.9
Auroro w/endo	4.3	4.7	5.0	5.7	4.9
Wilma	4.3	5.0	6.0	3.7	4.8
Molinda	4.7	4.3	5.0	4.7	4.7
Discovery	4.3	5.7	5.0	3.7	4.7
Napoli	4.0	4.0	5.7	5.0	4.7
Silvana	4.7	4.7	6.0	4.0	4.6
WW Rs 130	5.3	2.3	5.7	5.0	4.6
WW Rs 138	5.0	3.0	5.0	5.3	4.6
Barreppo	6.7	5.3	4.0	2.0	4.5
Shadow w/endo	5.3	4.7	4.7	3.3	4.5
Trophy	4.0	4.7	5.7	3.7	4.5
Shadow	4.3	4.3	4.7	4.7	4.5
Bighorn	4.3	4.7	5.7	3.3	4.5
Barlander	4.3	3.7	5.0	5.0	4.5
Atlanta	3.7	4.0	5.3	4.7	4.4
Mary	4.3	4.3	5.0	4.0	4.4
Dignity	3.3	3.3	6.0	5.0	4.4
Franklin	5.3	3.7	4.7	4.0	4.4
Reliant	4.7	4.0	4.7	4.0	4.3
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 5. Fine fescue cultivar performance under high mowing height, 2.25 inches.[1] *(continued)*

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
Camaro	5.7	4.3	4.0	3.3	4.3
Rainbow	4.0	4.7	4.7	4.0	4.3
Mx 86	3.3	3.3	6.0	4.5	4.1
Seabreeze	3.7	4.0	4.3	4.3	4.1
Talus	3.3	3.0	4.7	4.7	3.9
Barlotte	3.7	3.3	5.3	3.3	3.9
Fernando	3.7	3.0	4.3	4.3	3.8
Bargreen	4.0	3.3	5.0	3.0	3.8
Eureka	4.0	3.7	4.0	3.3	3.8
Marker	3.3	3.0	4.7	4.0	3.8
Sylvester	5.3	2.7	3.7	2.7	3.6
PST-4FE	3.7	3.7	4.0	3.0	3.6
Barskol	3.7	3.7	3.0	4.0	3.6
Valda	3.7	3.3	3.7	3.7	3.6
ERG 1143	3.0	3.3	5.3	2.7	3.6
Elanor	4.0	2.7	4.0	3.7	3.6
Puma	4.0	4.0	3.3	2.7	3.5
Dawson	2.7	3.0	4.5	3.0	3.3
Koket	3.0	3.3	3.3	3.7	3.3
Bardur	5.7	2.5	3.0	1.3	3.3
Comfort	4.0	3.0	3.7	2.7	3.3
Serra	3.3	3.7	3.5	3.0	3.3
Capitol	2.7	2.7	3.3	3.3	3.0
Simone	3.0	3.0	3.0	3.0	3.0
Barcrown	2.7	2.3	3.3	3.3	2.9
Waldorf	2.7	2.7	3.0	2.7	2.8
Barnica	3.7	2.3	2.7	2.0	2.7
Scaldis	3.0	2.0	2.3	2.0	2.3
Dover	2.3	2.3	2.3	2.3	2.3
Raymond	2.0	2.0	2.7	2.3	2.3
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 6. Fine fescue cultivar performance under high mowing height, 1.5 inches.[1]

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
SR 3100	6.0	6.7	7.0	6.7	6.6
Longfellow	6.7	6.3	7.0	5.3	6.3
Jamestown II	6.0	6.3	6.7	6.3	6.3
Herald	5.7	6.0	6.7	6.0	6.1
Dignity	4.3	5.3	6.7	6.7	5.8
PST-4NI	5.3	5.3	6.3	6.0	5.8
Bridgeport	6.3	5.3	5.7	5.0	5.6
PST-4R3	5.3	5.0	6.0	5.3	5.4
Jamestown	5.3	5.0	6.3	4.3	5.3
PST-4C8	4.7	5.0	5.7	5.7	5.3
Scarlet	5.0	5.0	5.7	5.0	5.2
SR 3000	5.7	4.7	5.7	4.7	5.2
Salem	5.3	4.7	5.0	5.0	5.0
Shadow w/endo	5.0	4.3	5.3	4.7	4.8
Eureka	5.3	4.3	5.7	4.0	4.8
Ensylva	5.0	4.0	5.7	4.7	4.8
Jasper	4.3	4.3	5.3	5.0	4.8
Vista	5.7	5.0	4.7	3.7	4.8
SR 5000	5.7	4.3	4.3	4.7	4.8
Atlanta	4.3	5.0	5.0	4.3	4.7
Proformer	7.5	5.5	6.0	3.7	4.6
Southport	5.3	5.0	5.0	3.0	4.6
Banner	5.0	4.3	4.7	4.3	4.6
Brigade	5.3	4.7	5.3	2.7	4.5
Reliant w/endo	5.3	4.0	4.3	4.3	4.5
Smirna	4.0	3.7	4.7	5.0	4.3
Collo	4.0	4.3	5.0	4.0	4.3
Epsom	3.7	4.3	4.7	5.5	4.3
HF 138	3.7	3.3	5.3	5.0	4.3
PST-43F	4.7	4.7	4.3	3.7	4.3
Flyer	4.7	4.3	4.3	3.7	4.3
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 6. Fine fescue cultivar performance under high mowing height, 1.5 inches.[1] *(continued)*

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
PST-4AG	5.0	4.3	4.3	3.3	4.3
Dawson	3.0	3.7	5.0	5.3	4.3
Aurora	5.0	3.7	4.0	5.5	4.2
WW Rs 143	4.3	3.0	5.0	4.3	4.2
Biljart	4.3	3.7	4.3	4.3	4.2
Mary	4.7	4.7	4.0	3.3	4.2
Cindy	4.7	3.7	4.3	4.0	4.1
Attila	4.3	3.7	4.7	3.7	4.1
Shademaster	4.0	4.0	4.3	4.0	4.1
Napoli	3.0	4.0	4.3	6.0	4.1
Bargena	5.0	3.0	3.3	4.5	3.9
Sunset	4.3	3.3	4.3	3.3	3.8
Belvedere	3.7	2.0	4.7	6.0	3.8
Seabreeze	3.3	3.3	4.0	4.0	3.7
Tiffany	3.7	4.0	3.7	3.5	3.6
Franklin	4.0	3.0	4.0	3.3	3.6
Barlander	4.0	3.0	3.7	3.7	3.6
Revere	3.7	4.0	3.7	3.0	3.6
Bargena II	4.0	3.0	4.0	3.3	3.6
Boreal	4.7	3.0	3.0	3.7	3.6
Aurora w/endo	3.7	2.7	3.7	5.0	3.6
Enjoy	4.3	3.3	3.0	3.0	3.4
Bardur	4.7	3.5	3.5	2.0	3.4
Silvana	3.7	2.7	3.2	4.0	3.4
ERG 1143	3.7	2.7	4.2	3.0	3.4
Capitol	3.3	3.3	3.0	3.7	3.3
Mx 86	3.7	2.7	3.7	3.5	3.3
Discovery	3.3	3.3	3.3	3.0	3.3
Reliant	3.0	3.0	4.0	3.0	3.3
PST-4FE	4.7	2.7	3.0	2.3	3.2
Wilma	3.7	3.0	3.3	2.7	3.2
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 6. Fine fescue cultivar performance under high mowing height, 1.5 inches.[1] *(continued)*

Cultivar	Turf Quality[2]				
	March	April	May	June	Average
Marker	3.7	3.0	3.3	2.7	3.2
Waldorf	3.7	2.7	3.3	3.0	3.2
Valda	3.3	3.3	3.0	2.7	3.1
Bighorn	3.3	2.7	3.7	2.7	3.1
Rainbow	4.3	3.3	2.7	2.0	3.1
Camaro	4.3	3.3	2.3	2.0	3.0
Barlotte	2.7	2.7	3.3	3.5	3.0
Raymond	2.7	3.0	3.0	3.0	2.9
Trophy	3.0	2.7	3.3	2.7	2.9
Elanor	3.7	2.3	2.7	3.5	2.9
Comfort	3.0	2.3	3.3	3.0	2.9
Shadow	3.3	2.7	2.7	2.7	2.8
WW Rs 138	3.7	2.0	3.0	3.0	2.8
Barreppo	4.0	2.3	2.7	2.0	2.8
Barcrown	3.3	2.7	2.7	2.3	2.8
WW Rs 130	4.0	1.7	2.7	2.7	2.8
Bargreen	3.3	2.3	3.0	2.0	2.7
Puma	3.3	2.7	2.3	2.5	2.7
Barskol	3.7	2.7	2.3	2.0	2.7
Molinda	3.7	2.7	2.0	2.0	2.6
Claudia	3.7	2.3	2.0	2.0	2.5
Fernando	3.3	2.0	2.3	4.5	2.5
Dover	2.3	2.7	2.3	2.3	2.4
Barnica	4.0	2.0	1.7	2.0	2.4
Talus	2.7	2.0	2.3	2.0	2.3
Sylvester	3.3	1.7	2.0	2.0	2.2
Scaldis	2.7	2.0	2.3	1.7	2.2
Simone	2.3	2.3	2.3	1.7	2.2
Koket	3.0	2.0	1.7	1.7	2.1
Serra	2.3	1.3	1.5	1.5	1.5
$LSD_{0.05}$	1.7	1.7	1.7	1.7	0.7

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

NTEP Bermudagrass Cultivar Trial

K.L. Diesburg

Research Protocol:	**NTEP Bermudagrass Cultivar Trial**
Location:	Southern Illinois University, Carbondale, Illinois.
Site:	Hosmer silt clay loam; plot size - 5 ft x 5 ft.
Plot Maintenance:	mowing height - 1.5 inches; pesticides - glyphosate in early March, preemergent, Ronstar, in early April, Barricade in May; fertilization - 4 lb N/M/yr.
Experimental Design:	RCB; 3 replications.

This is the second NTEP bermudagrass (*Cynodon dactylon*) trial. Due to a severe winter, the first trial, established in 1989, did poorly at Carbondale. Only seven cultivars survived. Those seven are being maintained as winter-hardy germplasm for further investigation. It will be interesting to see which ones survive in this new set. This is a record of establishment quality soon after planting and percent stand at the end of the season.

In 1992 a heavy infestation of goosegrass provided serious competition to the growth of the seeded cultivars. By September 12 all the plots would normally have been fully covered with bermudagrass in the absence of weed competition. Not all plots were completely grown in by the end of that growing season. The 1992/93 winter was mild, and spring recovery was excellent. By the end of this growing season most of the plots were grown in (Table 7).

There is a broad range of variation in turfgrass quality traits. Generally, the seeded types (Table 8) have more coarse leaf texture and lower shoot density than the vegetative types. There is a slight improvement turfgrass quality over common bermudagrass within the seeded types. The vegetative types have excellent turfgrass quality with notable differences in canopy height, color, and texture.

Table 7. Bermudagrass cultivar performance.[1]

Cultivar	Seeded or Vegetative	Turf Quality[2]				
		June	July	Aug	Sept	Avg
Cardinal	v	9.0	9.0	8.7	9.0	8.9
TDS-BM1	v	8.7	9.0	7.7	8.0	8.3
FHB-135	v	9.0	7.0	8.0	9.0	8.3
Tifgreen	v	8.3	7.3	7.7	7.7	7.8
Tifway	v	8.3	7.3	7.3	7.7	7.7
Midlawn	v	8.0	8.3	6.7	6.7	7.4
Midfield	v	8.0	9.0	5.7	7.0	7.4
Midiron	v	8.0	6.7	6.7	7.0	7.1
964	v	8.0	6.7	6.0	6.0	6.7
950	v	7.0	5.0	6.0	6.3	6.1
Texturf 10	v	6.3	6.0	5.7	6.0	6.0
STF-1	v	6.0	7.3	5.0	5.3	5.9
KO-90-NB	v	8.0	5.0	5.7	4.3	5.8
FMC 6-91	s	7.0	6.5	5.0	4.3	5.7
FMC 5-91	s	5.5	6.0	5.7	5.0	5.5
Sonesta	s	7.7	6.5	3.7	4.3	5.5
OKS 91-11	s	6.7	6.3	5.0	4.0	5.5
Brute	v	7.3	5.3	4.0	4.7	5.3
J-912	s	7.0	5.0	4.7	4.0	5.2
Sahara	s	6.3	4.0	5.3	4.3	5.0
OKS 91-1	s	7.0	3.7	3.7	4.7	4.8
FMC 2-90	s	6.7	3.3	4.0	4.7	4.7
FMC 3-91	s	5.7	4.5	4.0	4.3	4.6
FMC 1-90	s	6.0	3.0	4.3	4.7	4.5
Sundevil	s	5.7	4.0	4.0	4.0	4.4
Cheyenne	s	5.5	3.0	4.0	4.7	4.3
Arizona Common	s	5.3	2.7	3.7	4.7	4.1
J-27	s	4.0	4.5	4.0	3.7	4.0
1675	v	4.7	4.0	2.7	4.3	3.9
Centipede	v	3.3	4.0	3.3	4.7	3.8
90173	s	5.0	3.0	3.3	3.7	3.8
Arizona Common	v	4.0	2.0	3.7	5.3	3.8
668	v	4.7	2.0	2.0	3.0	2.9
Guymon	s	2.3	3.0	1.7	2.7	2.4
$LSD_{0.05}$		1.0	1.1	1.1	1.0	0.3

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 8. Percent plot cover and texture of bermudagrass cultivars[1]

Cultivar	Seeded or Vegetative	Percent Plot Cover				Texture[2]
		June	July	Aug	Sept	
STF-1	v	89	100	100	100	5.7
TDS-BM1	v	89	100	100	100	9.0
Midfield	v	93	98	100	100	6.0
950	v	12	84	100	100	5.0
Tifway	v	52	97	99	100	8.0
Arizona Common	v	48	96	99	100	3.0
Tifgreen	v	88	97	99	100	9.0
964	v	11	72	99	100	6.7
Midlawn	v	78	98	98	100	8.0
Texturf 10	v	70	89	98	100	6.0
Midiron	v	72	97	97	100	6.7
Arizona Common	s	27	75	93	99	3.3
FHB-135	v	20	74	85	98	9.0
668	v	13	70	95	97	2.3
Sahara	s	29	69	78	95	4.3
OKS 91-1	s	14	72	93	94	5.0
90173	s	37	64	83	93	3.3
FMC 2-90	s	14	46	67	85	4.0
Cheyenne	s	53	69	72	83	2.5
Guymon	s	10	30	49	83	4.0
OKS 91-11	s	22	39	47	83	5.7
Sundevil	s	38	60	69	82	4.0
FMC 1-90	s	53	66	67	75	3.3
J-27	s	65	64	69	73	3.7
FMC 3-91	s	11	25	42	73	4.0
J-912	s	14	23	58	70	6.3
Sonesta	s	34	35	47	69	5.0
1675	v	2	12	33	68	5.0
FMC 6-91	s	45	43	56	67	5.7
FMC 5-91	s	50	35	41	65	5.7
Cardinal	v	2	16	15	40	9.0
KO-90-NB	v	1	3	14	40	6.0
Brute	v	1	4	13	28	4.0
Centipede	v	2	4	12	26	4.0
$LSD_{0.05}$		32	46	41	32	1.4

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Texture ratings based upon a scale of 1 to 9 with 9 = very fine leaves to 1 = coarse leaves.

NTEP Zoysiagrass Cultivar Trial

K.L. Diesburg

Research Protocol:	**NTEP Zoysiagrass Cultivar Trial**
Location:	Southern Illinois University, Carbondale, Ill.
Site:	Hosmer silt clay loam; plot size - 5' x 6'.
Plot Maintenance:	mowing height - 1.5 inches; pesticides - preemergent, Ronstar; pre- and postemergent Princep; postemergent, Trimec Plus; irrigation - none; fertilization - 3 lbs N/M/yr, SCU.
Experimental Design:	RCB; 3 replications.

This is the first assemblage of zoysiagrass cultivars by the USDA for testing on a national scale. A total of 34 locations were established in 1991. This is a report of the first year of cultivar performance after the 1991 establishment year.

This trial has been an excellent test of establishment through stressful conditions. After initial establishment was assured with irrigation, the trial went through a great deal of moisture stress late in 1991 and in 1992 from mid-June through early September. Additionally, the pre- and postemergent herbicides do not control fall panicum. The trial was uniformly covered with this weed through most of the 1992 growing season. One entry died (replace in 1993) and a few are barely surviving. These types are usually very fine-textured and slow-growing. But there are some fine-textured types that have grown in completely along with the more coarse-textured types.

Table 9. Performance of zoysiagrass cultivars.

Entry	Turf Quality				
	May	June	July	August	Average
DALZ8508	9.0	9.0	9.0	9.0	9.0
DALZ9006	9.0	9.0	9.0	9.0	9.0
DALZ8516	9.0	9.0	9.0	9.0	9.0
DALZ8507	9.0	8.7	9.0	9.0	8.9
QT2004	9.0	9.0	8.7	8.7	8.8
CD2013	9.0	8.3	8.7	9.0	8.8
Emerald	9.0	8.0	9.0	8.5	8.6
34-35A	9.0	8.0	8.3	9.0	8.6
DALZ8501	9.0	8.0	8.5	8.7	8.5
TC2033	8.3	7.7	9.0	9.0	8.5
DALZ8701	7.3	8.0	8.3	9.0	8.2
Meyer	8.3	7.5	8.0	8.7	8.1
DALZ8502	8.0	4.5	9.0	9.0	7.6
QT2047	5.3	5.7	7.3	7.7	6.5
Sunburst	6.0	6.0	7.0	6.7	6.4
DALZ8514	5.7	6.0	5.3	6.3	5.8
TC5018	3.7	4.7	6.3	7.3	5.5
El Toro	5.3	5.3	5.0	6.3	5.5
Belair	6.7	3.5	6.3	5.0	5.4
CD259-13	4.7	5.0	5.7	6.0	5.3
DALZ8512	4.0	4.0	5.0	5.3	4.6
TGS-W10	3.0	4.0	3.7	4.0	3.7
Midwest	2.0	5.0	3.0	4.5	3.6
TGS-B10	4.0	2.0	3.3	2.7	3.0
JZ-1	2.7	2.5	3.0	2.7	2.7
Midcrest	2.0	3.0	2.0	2.0	2.3
Korean Common	2.0	2.0	2.3	2.3	2.2
$LSD_{0.05}$	1.3	1.1	1.0	0.9	0.5

Table 10. Lateral growth of zoysiagrass cultivars.

Entry	Percent Cover			
	May	June	July	August
El Toro	97	99	100	100
DALZ8514	98	100	100	100
DALZ8512	99	100	100	100
CD2013	75	75	93	96
TC2033	86	92	98	96
TC5018	87	93	98	95
Sunburst	81	90	98	94
CD259-13	70	76	89	93
QT2047	63	86	93	91
DALZ9006	52	68	82	86
DALZ8508	39	53	61	76
DALZ8507	37	60	70	72
Korean Common	27	36	56	63
Meyer	26	35	43	61
QT2004	56	57	63	61
JZ-1	28	37	46	56
Midwest	31	28	47	45
DALZ8501	24	29	31	42
34-35A	10	25	38	40
Emerald	17	32	34	36
DALZ8502	2	14	25	34
Belair	19	22	29	32
TGS-W10	9	20	18	19
Midcrest	2	6	6	13
TGS-B10	5	4	9	12
DALZ8516	2	2	3	4
DALZ8701	2	2	3	3
$LSD_{0.05}$	34	30	39	35

USDA National Buffalograss Trial

K.L. Diesburg

Research Protocol:	**Buffalograss Cultivar Evaluation**
Location:	Southern Illinois University, Carbondale, Ill.
Site Preparation:	Hosmer silt clay loam.
Seeding/ Establishment:	date plugged - June 10, 1991; plugging rate - 1 ft centers; plot size - 5 ft x 5 ft, 2 ft between plots.
Plot Maintenance:	mowing height - 2.25 inches; pesticides - Dacthal and Ronstar preemergent; irrigation - as needed to prevent stress; fertilization - 3 lb N/M/yr SCU, Nitroform, and Nutralene.
Experimental Design:	RCB; 3 replications.

This is the first buffalograss trial issued by the USDA. This species is increasing in popularity. Our decreasing water supplies indicate that it will become increasingly difficult to use water for aesthetic purposes. It then becomes more important to have a turfgrass species that can persist at a reasonably good level of turf quality with little or no irrigation through the summer. Buffalograss, a species native to North America, is adapted well to long periods of drought that are frequent in the Great Plains. Seed production is difficult because the seeds are produced very close to the soil surface and, therefore, cannot be harvested with standard field machinery. The species is a vigorous stoloniferous spreader, so it is practical to establish it with vegetative plugs, as is done with Meyer zoysiagrass.

The growth habit among buffalograss genotypes is highly variable. Color and density were rated separately in order to more accurately characterize the entries. Some entries that rank highest in one category rank among the lowest in another, other entries rank similarly across all traits. It is obvious that the degree of satisfaction with buffalograss will depend heavily upon whether the cultivar being used has the kind of texture, color, and density the turfgrass manager expects. This match can be made only if the cultivar is observed before purchase.

Table 11. Performance of NTEP buffalograss cultivars[1]

Cultivar	Turf Quality[2]					Percent Spring Greenup[3]		
	May	June	July	Aug	Avg.	May 7	Color[4]	Density[5]
NTDG-3	6.7	7.3	7.7	7.3	7.3	79	7.7	5.7
Buffalawn	6.7	8.0	7.3	7.0	7.3	20	3.0	8.7
Texoca	6.0	8.0	7.0	8.0	7.3	58	8.3	7.3
NTDG-1	6.7	7.7	7.3	7.0	7.2	80	8.0	6.7
Highlight 25	6.7	8.0	6.3	7.3	7.1	14	1.0	7.7
NE 84-436	6.7	6.0	8.7	6.7	7.0	95	8.0	5.3
Highlight 15	6.3	8.7	6.0	6.7	6.9	18	1.7	7.7
AZ 143	5.3	6.7	8.3	7.0	6.8	95	7.7	5.3
NTDG-2	5.0	7.3	7.3	7.0	6.7	84	8.3	7.3
NTDG-5	6.7	6.3	7.0	6.3	6.6	84	7.0	5.3
Highlight 4	5.3	8.3	6.0	6.7	6.6	7	3.0	8.0
NTDG-4	6.3	6.3	7.3	6.3	6.6	84	7.3	4.7
NE 85-378	7.0	6.0	6.3	6.7	6.5	91	9.0	6.3
Prairie	5.0	6.7	8.3	5.7	6.4	37	4.7	5.7
315	7.0	5.7	6.0	7.0	6.4	96	8.3	7.0
Rutger's	6.0	8.0	5.7	5.7	6.3	8	2.0	7.3
NE 84-45-3	5.3	6.3	5.7	5.3	5.7	58	7.7	6.0
609	5.3	6.7	4.7	4.3	5.3	30	8.7	8.0
Sharp's Improved	4.7	5.7	6.0	4.7	5.3	72	7.7	3.7
Top Gun	4.7	5.3	5.3	4.3	4.9	57	7.3	5.7
Bison	4.0	4.0	4.0	3.7	3.9	71	9.0	2.0
Plains	2.7	4.0	4.3	3.3	3.6	55	9.0	2.3
$LSD_{0.05}$	2.0	1.6	2.4	2.1	1.5	18	1.3	1.6

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality evaluations are made on a 1-9 scale where 9=excellent turfgrass quality and 1=very poor turfgrass quality.

[3]Percent of plot having green shoots.

[4]Color ratings are based on a 1-9 scale where 9=dark bluish green and 1=pale green.

[5]Density ratings are based on a 1-9 scale where 9=most and 1=fewest number of leaves and shoots per area.

Low Input Sustainable Turf (LIST)

K.L. Diesburg

The emphasis in turfgrass management of the 1990s is one of efficient utilization of resources in obtaining the turf needed or desired while minimizing pollution of the environment. In low-management situations the turf desired is uniform, persistent cover with turfgrass color, texture, and density taking lower priority. The conclusion of the Alternative Species Project during 1991 identified five perennial grass species best suited to this purpose. The study was conducted in eleven states of the upper midwest United States, so we are confident that these species would be appropriate over a broad geographic area. A 3-inch clipping height allowed best species performance.

In the next phase of this program we are evaluating the same five species plus three others under three different schedules of clipping frequency. Many times in low-management situations the manager prefers to mow as few times as possible. We are observing just how damaging an infrequent clipping schedule compares to a more frequent clipping schedule in terms of turfgrass cover and persistence.

Research Protocol:	**Low Input Sustainable Turf (LIST)**		
Locations:	Ohio	Indiana	Illinois
	Michigan	Wisconsin	Minnesota
	Iowa	Missouri	North Dakota
	Nebraska	Kansas	
Seeding/ Establishment:	date seeded - September 21, 1992 (Carbondale); plot size - 4' x 12'; pesticides - preemergent (Tupersan) on cool season grasses ; fertilization - N-P-K (1-4-2) @ 0.5 lb N/M at seeding; irrigation to assure establishment.		
Plot Maintenance:	fertilization - 1 lb N/M/yr, SCU; clipping height - 3 inches; pesticides - none; irrigation - none.		
Experimental Design:	Strip-plot; three clipping frequencies 1. alternate weeks 2. once per month 3. twice per year; species 1. sheep fescue 2. tall fescue 3. buffalograss 4. redtop 5. colonial bentgrass 6. Kentucky bluegrass 7. hard fescue 8. zoysiagrass; 3 replications.		

Buffalograss and zoysiagrass could not be evaluated because 1993 is their year of establishment. Among the cool-season grasses, `Kentucky-31' tall fescue without endophyte, `Scaldis' hard fescue, `Barricuda' redtop, an experimental colonial bentgrass, and `Cindy' red fescue were the best in turfgrass quality (Table 12). Species that did best with more frequent clipping were `Kentucky-31' tall fescue without endophyte, `Barricuda' redtop, an experimental colonial bentgrass, Streaker' redtop, `Exeter' colonial bentgrass, and a sheep fescue. The hard fescues, Kentucky bluegrass, and red fescue were unaffected by clipping frequency. `Exeter' colonial bentgrass and `South Dakota Common' Kentucky bluegrass were slower to recover from winter dormancy

this spring (Table 13). Spring canopy height of the tall fescues higher than those of the other species. `South Dakota Common' Kentucky bluegrass and the hard and sheep fescues allowed more encroachment of summer weeds than the other species.

This report is presented to make you familiar with this project. Do not base any decision upon this year's results, regarding these low-management species. The first year after establishment is usually a poor indication of how well a species will persist over several years.

Table 12. Performance of LIST species.[1]

Specie	Turf Quality by Clipping Frequency[2]		
	Alternate Weeks	Once per Month	Twice per Year
Tall fescue wo/endo `Kentucky-31'	7.2	6.4	6.2
Hard fescue `Scaldis'	7.2	7.1	7.1
Redtop `Barricuda'	7.2	6.1	6.0
Colonial bentgrass, experimental	7.1	6.4	5.7
Red fescue `Cindy'	7.0	6.6	6.9
Tall fescue w/endo `Kentucky-31'	6.6	5.9	6.6
Redtop `Streaker'	6.4	5.3	4.3
Hard fescue `Valda'	6.4	6.3	6.3
Colonial bentgrass `Exeter'	6.3	5.3	4.9
Hard fescue `9032'	6.3	5.9	5.8
Sheep fescue	5.9	5.3	5.2
Kentucky bluegrass `South Dakota'	5.0	5.2	4.9
$LSD_{0.05}$	0.7	0.7	0.7

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 13. Performance of LIST species.[1]

Specie	Recovery 3/13	Canopy Height 3/13	Percent Weeds[2] 7/7
Redtop `Barricuda'	89	4.0	1
Red fescue `Cindy'	91	4.0	2
Hard fescue `Scaldis'	86	2.0	18
Colonial bentgrass, experimental	77	2.0	0
Tall fescue wo/endo `Kentucky-31'	91	6.0	8
Tall fescue w/endo `Kentucky-31'	88	6.3	6
Hard fescue `Valda'	84	2.0	25
Hard fescue `9032'	84	1.7	33
Colonial bentgrass `Exeter'	64	1.7	4
Redtop `Streaker'	77	2.3	0
Sheep fescue	77	1.7	18
Kentucky bluegrass `South Dakota'	62	1.3	39
$LSD_{0.05}$	25	2.3	21

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Percent of plot area occupied by weeds.

TURFGRASS MANAGEMENT EVALUATIONS AT THE UNIVERSITY OF ILLINOIS

The Evaluation of a Tall Fescue Blend at 4 Fertility Levels and 3 Mowing Heights

J.E. Haley and T.B. Voigt

Research Protocol:	**Tall Fescue Management Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Seeding/ Establishment:	establishment date - spring,1989; turf - mature Triathalawn tall fescue (Bonanza, Olympia, and Apache blend); plot size - 3 ft x 10 ft; pesticides - none.
Fertility Treatments:	0 lb N/M; 2 lbs N/M/yr applied 1 lb in May & Sept; 4 lbs N/M/yr applied 0.5 lb in June, July & 1 lb in May, Aug., Oct.; 6 lbs N/M/yr applied 0.5 lb Apr, July & 1 lb in May, June, Aug., Sept.,Oct.; fertilizers were broadcast by hand.
Mowing Treatments:	1 inch, 2 inches, 3 inches mowing height; A rotary mower is used and clippings are removed and discarded.
Plot Maintenance:	pesticides - none, weeded by hand 8/89; irrigation - none;
1989	fertilization - treatments applied on May 10, June 1, June 22, July 14, Aug. 11 Sept. 12, Oct. 11.
1990	fertilization - treatments applied on Apr. 17, May 18, June 21, July 11, Sept. 13 & Oct. 19.
1991	fertilization - treatments applied on Apr. 26, May 28, June 20, Aug. 5, Aug. 28, Sept. 26, Oct. 21.
1992	fertilization - treatments applied on Apr. 23, May 17, June 16, July 15, Aug. 21, Sept. 22, Oct. 15.
1993	fertilization - treatments applied on Apr. 20, May 19, June 16, July 15, Aug. 23, Sept. 1 6, Oct. 19.
Experimental Design:	strip plot (fertilization, randomized in block, mowing height stripped); 3 replications.

Research indicates that improved tall fescue cultivars have retained good drought, heat, and wear tolerance. However, it is not yet known how management practices effect the overall quality of these improved cultivars. The purpose of this study is to evaluate the effects of nitrogen fertilization and mowing height on the quality of turf-type tall fescue. Quality and weed population evaluations are reported in Table 1 and 2.

Tall fescue quality was highest where the turf was fertilized with 4 or 6 lbs of nitrogen annually and when mowed at 2 or 3 inches in height. Annual bluegrass populations were greatest in tall fescue maintained at a 1 or 2 inch mowing height. There was no significant difference among annual bluegrass populations at the 4 levels of fertilization. Both mowing height and fertility level effected crabgrass invasion. Turf mowed at 1 inch and receiving no nitrogen had the greatest crabgrass populations. Turf maintained at the 1 inch mowing height had the largest

weed populations. Broadleaf weed populations were largely effected by nitrogen fertilization. Tall fescue that was not fertilized had significantly high broadleaf weed populations than turf fertilized with any rate of nitrogen. Broadleaf weed populations consisted primarily of white clover. Based on these preliminary results, it appears that improved tall fescue cultivars benefit from nitrogen fertilization. They should be mowed at a minimum of 2 inches in height.

Table 1. The evaluation of 4 fertility levels and 3 mowing heights when applied to a tall fescue turf blend during the 1993 growing season.[1]

Fertility Level[4]	Spring Greenup[2] 3/30	Quality[3] 4/27	5/27	6/25	7/22	8/23	9/16	10/15
0 lb	4.0a	4.8a	4.0a	3.4a	3.1a	3.2a	2.7a	3.7a
2 lbs	5.0b	5.8ab	6.0b	5.4b	4.2b	3.9b	3.0a	4.4ab
4 lbs	5.4c	6.8bc	6.3bc	6.2bc	4.7b	5.2c	5.0b	5.6b
6 lbs	6.0d	7.8c	6.9c	6.8c	4.9b	5.3c	5.8b	6.9c

Mowing Height	Spring Greenup[2] 3/30[ns]	Quality[3] 4/27[ns]	5/27	6/25	7/22	8/23	9/16	10/15
1 inch	6.7c	6.0	5.1a	3.7a	3.2a	2.4a	1.8a	2.2a
2 inches	5.1b	6.8	6.2b	5.9b	4.5b	4.8b	4.7b	6.2b
3 inches	3.7a	6.1	6.1b	6.8c	5.0b	6.1c	5.9c	7.1c

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Spring greenup evaluations are made on a 1-9 scale where 9 = green, actively growing turf and 1 = dormant turf.

[3] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

[4] Fertility refers to the total amount of nitrogen in pounds per 1000 square feet applied annually.

[ns] No significant difference was found among the means in this group of data.

Table 2. The evaluation of weed invasion in a tall fescue turf blend maintained at 4 fertility levels and 3 mowing heights during the 1993 growing season.[1]

Fertility Level[5]	% Poa annua[2] 6/21[ns]	% Crabgrass[3] 4/27	% Broadleaf[4] 5/27
0 lb	5.0	22.8b	36.7b
2 lbs	13.3	17.2ab	9.6a
4 lbs	5.8	12.2a	1.4a
6 lbs	10.0	7.6a	0.3a

Mowing Height	% Poa annua 6/21	% Crabgrass 4/27	% Broadleaf 5/27[ns]
1 inch	0.0a	36.7c	12.9
2 inches	3.5a	8.2b	12.0
3 inches	22.2b	0.0a	11.1

An Evaluation of Turf Quality and Home Owner Satisfaction Resulting From Five Turf Management Programs

J.E. Haley, T.B. Voigt, W. C. Sullivan

There are approximately 49.8 million owner-occupied, single family homes in the U. S. (Watson et. al., 1992) and more than twenty million acres of lawns in the United States (Roberts and Roberts). Lawn care, whether commercial or do-it-yourself, represents a large industry. In 1986, the lawn care industry in the United States was responsible for more than one and one-half billion dollars in business volume (Daniel and Freeborg, 1987). Lawn care sales to do-it-yourself consumers in 1985 totalled more than six hundred and fifty million dollars (Watson et. al., 1992). It is estimated that there are more than fifty six million Americans involved with caring for their own lawns (National Gardening Association 1987-88).

It is assumed that consumers demand lawns completely free of weeds, insects and diseases. A considerable portion of the service the lawn care industry provides involves fertilizing, and applying herbicides and insecticides to residential and commercial lawns

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Percent Poa annua refers to the percent of the plot area covered with annual bluegrass.

[3] Percent crabgrass refers to the percent of the plot area covered with crabgrass plants..

[4] Percent broadleaf refers to the percent of the plot area covered with broadleaf weeds. In this evaluation the broadleafweed population was made up of primarily white clover.

[5] Fertility refers to the total amount of nitrogen in pounds per 1000 square feet applied annually.

(Watson et. al., 1992). Fertilizer and pesticide applications most often occur at scheduled intervals primarily for business, rather than agronomic reasons. A predetermined schedule allows the most efficient access to the greatest number of lawns. In addition to using a predetermined schedule, lawn care companies apply pesticides to entire turf areas, regardless of pest presence or absence, because this method requires less employee training and time.

Pesticide applications to home lawns are also made by home owners. Like lawn care companies, home owners often apply pesticides at scheduled calendar intervals to entire lawns rather than on a as needed basis. Extension service representatives and fertilizer and pesticide manufacturers frequently encourage this type of pesticide application program since it aids untrained individuals in managing a completely pest free lawn.

Both home owners and lawn care companies often apply pesticides when no pests are present. In 1989, the United States Environmental Protection Agency (EPA) estimated that there were about six million pounds of diazinon applied to home and commercial turf (USGAO, 1990). In addition, the EPA also estimated that nearly four million pounds of 2,4-D were applied annually to residential turf (USGAO, 1990). It is possible, that if pesticides were applied only when pests are present, that these numbers could be significantly reduced.

An alternative to the application of lawn care products on a predetermined schedule is to apply many of these same products on an "as needed" basis. Using an Integrated Pest Management (IPM) program on residential lawns is one method that should be explored. The overall goal of an IPM program is to produce the healthiest lawn possible by combining all available turf and pest management alternatives (Voigt and Fermanian, 1991). In this plan, pest tolerance levels are established, lawns are regularly monitored (scouted) for the presence of pests, an appropriate maintenance program is implemented, and controls (cultural, biological, or chemical) are used when necessary (Daar, 1986).

There has been little research comparing consumer preferences for lawns maintained with standard practices compared to an IPM approach. There are trade-offs associated with each approach. IPM methods can use less pesticides (measured in pounds per year) when compared with lawn care practices that apply pesticides at regularly scheduled intervals regardless of need (Short et. al., 1982). However, lawns managed using IPM methods may contain a few weeds, insects or diseases.

Is turf quality reduced using IPM programs? Will home owners accept reduced turf quality if they know that less pesticides are used? How do consumers respond to these potential trade-offs? Do turf-care specialists' perceptions of turf quality differ from home owners' preferences? This study will investigate these questions by conducting a two- to three-year study at the Horticulture Research Field Laboratory in Urbana, Illinois. Two hundred forty local home owners without particular expertise in turfgrass and turf-care specialists will participate in this study.

Five management treatments are included in this study: 1) a management program as practiced by lawn care companies (PLC); 2) a management program where no fertilizer or pesticides are applied (Untreated); 3) a management program using only organic fertilizers (Organic); and 4) two management programs using IPM programs

(IPM 1 and IPM 2). See the boxed information for details on each treatment.

The objectives of this study are to:

A. determine the performance levels of each management regime by rating weed, insect, and disease levels and measuring quantities of applied pesticides;
B. determine preference for turf associated with each treatment, by three distinct groups; and
C. determine the influence of receiving management information on turf quality evaluations.

Research Protocol:	**An Evaluation of Turf Quality and Home Owner Satisfaction Resulting From Five Turf Management Programs**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Seeding/ Establishment:	establishment date - September 1992; turf - mature Kentucky bluegrass blend ; plot size - 9 ft x 11 ft;
Professional Lawn Care Treatment:	fertilizer - Lebanon 18-5-9 @ 4 lbs N/M/yr, (0.75 lb N/M in Apr. & early July, 0.5 lb N/M in May, 1.0 lb N/M in Sept. & Nov.; herbicides - preemergence control in April, postemergence broadleaf weed control in May; insecticides - grub control in August.
Organic Treatment:	fertilizer - milorganite @ 4 lbs N/M/yr (1 lb N/M in early May, mid to late June, early Sept., and mid Nov.); herbicides & insecticides - none are used.
IPM 1 Treatment:	fertilizer - Lebanon 18-5-9 @ 4 lbs N/M/yr, (1.0 lb N/M in May, June, Sept., & Nov.); herbicides - when present all weeds controlled with postemergence herbicides; insecticides - grub control @ 4-6 grubs/sq ft, webworm control @ 2 worms/sq ft.
IPM 2 Treatment:	fertilizer - Lebanon 18-5-9 @ 4 lbs N/M/yr, (1.0 lb N/M in May, June, Sept., & Nov.); herbicides - controlled with postemergence herbicides when weeds are present @ 100 sq in of weeds/sq yd turf; insecticides - grub control @ 8-12 grubs/sq ft, webworm control @ 2 worms/sq ft.
Untreated:	no fertilization, weed or insect pest control.
Management:	mowing - all treatments mowed with mulching mower; irrigation - as needed to prevent stress.
Experimental Design:	RCB; 3 replications.

Evaluations will be made by three groups: 1) turf-care specialists; 2) local home owners who are unaware of the treatments; and 3) local home owners who have knowledge of each plot treatment.

During the 1993 growing season the plots were evaluated only by one turf researcher. Other evaluations were delayed to allow a full year of treatments to be applied to each plot. It was necessary to apply postemergence broadleaf weed control herbicide to the plots maintained under IPM1 management. Broadleaf weeds in these plots were spot treated in the spring at the same time that the PLC treatment was made. Turf quality appeared to be most effected by fertilizer source and applications. No significant difference was observed between the PLC treatment and the IPM 1 treatment on any of the evaluation dates (Table 3). April through June no significant differences were observed between the IPM 2

program and IPM 1 or PLC program. Lower quality of the IPM 2 plots July through October was a result of increasing weed populations. The organic program produced turf quality rated only as fair. This is probably due to the slower nitrogen release properties of the organic fertilizer. Turf density in these plots was poor and weed populations were able to grow.

Table 3. The evaluation of 5 home lawn management programs.[1]

Management	Quality[2]						
Program	4/23	5/14	6/17	7/22	8/23	9/16	10/15
PLC	7.0c	7.0c	7.0c	7.0c	7.0c	7.0c	8.0d
Organic	4.7b	4.7b	5.0b	4.0a	4.3a	4.0a	4.3b
IPM 1	6.7c	6.7c	7.0c	7.0c	7.0c	6.7c	7.7d
IPM 2	6.7c	6.7c	7.0c	6.0b	5.7b	5.3b	6.3c
untreated	3.7a	3.7a	3.0a	3.0a	3.7a	3.0a	3.0a

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Quality evaluations are made on a 1-9 scale where 9 = excellent turfgrass quality and 1 = very poor turfgrass quality.

ANNUAL AND PERENNIAL GRASS CONTROL RESEARCH AT THE UNIVERSITY OF ILLINOIS

Crabgrass (*Digitaria* spp.) is a common weed and continual problem in Illinois turf. It germinates in late spring and throughout summer on sunny, moist sites. Once established, crabgrass, often crowds out desirable turf. This is especially a problem in spring plantings or areas where the turf is weakened by stress or poor maintenance. Preemergence or postemergence herbicides are available to control crabgrass.

Preemergence Crabgrass Control

J.E. Haley, T.W. Fermanian, and D.J. Wehner

Research Protocol:	**Preemergence Crabgrass Control Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - April 22, 1993, all treatments June 17, 1993, 2nd applications of Team on fertilizer and Pendimethalin on fertilizer; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa; granular herbicides - broadcast by hand.
Turf Maintenance:	mowing height - 0.5 inches in May and June, 2 inches July through August; pesticides - no additional pesticides; irrigation - little irrigation was necessary due to heavy rainfall; fertilization - none .
Experimental Design:	RCB; 3 replications.

Most turfgrass managers prefer to control crabgrass with preemergence herbicides. These herbicides are applied prior to weed germination in the spring. In central Illinois germination begins mid-April to mid-May. To insure season long control a second application of preemergence herbicide is often needed. There are a number of preemergence herbicides for control of crabgrass on the market today. Periodically, new herbicides or new turf formulations of herbicides are developed. These herbicides need to be evaluated for efficacy and compared to the existing materials. The purpose of this research was to evaluate MON 65134 0.172G and MON 65135 0.086G (dithiopyr, Monsanto Agricultural Co.), FN9056 (benefin + trifluralin with fertilizer, DowElanco), FN9064 and NAF 65 (isoxaben + Team on fertilizer, DowElanco), NAF 69 (pendimethalin 1.21% with fertilizer, LESCO, Inc.), EXP30742B 2.3G and EXP31068A 5G (undisclosed, Rhone-Poulenc). Also included in this evaluation were PreM 60DG (pendimethalin, LESCO Inc.), Team 2G (benefin + trifluralin, DowElanco), Dimension 1EC (dithiopyr, Monsanto Agricultural Co.), Barricade 65WG (prodiamine, Sandoz Crop Protection), Ronstar 2G (oxadiazon, Rhone-Poulenc), and Betasan 8.5G (bensulide, ICI Americas Inc.). Table 1 contains herbicide rates. Each replication included an untreated plot.

Table 1. The evaluation of herbicides applied 22 April 1993 for preemergence control of crabgrass in a common Kentucky bluegrass turf.[1]

Herbicide	Rate lbs ai/A	% Crabgrass Control[2] 7/21 90 DAT	8/10 110 DAT	9/01 130 DAT
Barricade 65WG	0.5	89.1a-c	73.9ab	74.3ab
Barricade 65WG	0.65	100.0c	96.9de	91.4de
Barricade 65WG	0.75	100.0c	100.0e	98.9e
Betasan 8.5G	10	100.0c	95.4c-e	94.9de
Betasan 8.5G	7.5	98.2bc	84.6b-e	90.9de
Dimension 1EC	0.38	80.0a	72.4ab	65.7a
Dimension 1EC	0.5	90.9a-c	78.5a-d	74.3ab
EXP30742B	5.0	80.0a	64.7a	65.7a
EXP31068A	5.0	89.1a-c	77.0a-c	76.0a-c
Ronstar 2G Bio	3.0	96.4bc	96.9de	93.7de
Team 2G	3.0	96.4bc	96.9de	89.7de
Team on fertilizer (FN9056)	1.5/1.5	100.0c	100.0e	94.9de
Team on fertilizer (FN9056)	2.0	100.0c	98.5e	90.9de
Team on fertilizer (FN9056)	3.0	98.2bc	96.9de	84.6b-d
Gallery & Team on fertilizer (FN9064)	250 lbs cf/A	98.2bc	98.5e	90.9de
MON 65134 0.172G	0.25	89.1a-c	86.2b-e	87.4b-e
MON 65135 0.086G	0.125	85.4ab	81.6a-e	82.8b-d
MON 65135 0.086G	0.187	92.7a-c	90.8b-e	86.8b-e
Gallery & Team on fertilizer (NAF 65)	250 lbs cf/A	98.2bc	95.4c-e	96.0de
Pendimethalin on fertilizer (NAF 69)	1.5/1.5	90.9a-c	90.8b-e	84.0b-d
Pendimethalin on fertilizer (NAF 69)	2.0	96.4bc	89.2b-e	88.6c-e
Pendimethalin on fertilizer (NAF 69)	3.0	92.7a-c	90.8b-e	93.7de
Pendimethalin 60DF	3.0	100.0c	98.5e	88.6c-e

Note that minimum temperatures throughout the growing season were higher than average and rainfall greater than normal. Heavy rainfall flooded the crabgrass research plots several times. Crabgrass germination was not uniform throughout the study site. On July 21 untreated check plots in rep. 1 and 3 had 20% cover with crabgrass, and 15% cover with crabgrass in rep. 2. On August 10 the untreated plots had 20% crabgrass cover in rep. 1, 15% cover in rep. 2 and 30% cover in rep. 3. On September 1 rep. 1 was covered with 60% crabgrass, rep. 2 with 45% crabgrass and rep. 3 with 70% crabgrass. All plots treated with herbicide had significantly less crabgrass than the untreated check

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Percent crabgrass control is determined by making a visual estimate of crabgrass cover in each treated plot and comparing this with the visual estimate found in the untreated plot. Crabgrass cover in the untreated plot averaged 18.3% on 7/21, 21.7% on 8/10 and 58.3% on 9/01.

(not shown). Crabgrass control was significantly different among herbicide treatments on all evaluation dates (Table 1).

Postemergence Crabgrass Control

J.E. Haley, D.J. Wehner, and T.W. Fermanian

Research Protocol:	**Postemergence Crabgrass Control Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL; early trial - silt loam soil; late trial - heavy clay soil.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - July 2, 1993, treatments applied at the 1-4 leaf stage of weed growth, July 14 reapplied Daconate 6; July 30, 1993, all treatments applied at the 1-4 tiller stage of weed growth; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa.
Plot Maintenance:	mowing height - 1.5 inches; pesticides - no additional pesticides; irrigation - little irrigation needed due to heavy rainfall; fertilization - none.
Experimental Design:	RCB; 3 replications.

Postemergence crabgrass control herbicides are needed if preemergence herbicides are not applied, fail to control crabgrass throughout the season, or are applied after some weed germination has occurred. In the past, organic arsenicals were the primary herbicides used for postemergence crabgrass control. More recently, fenoxaprop (Acclaim, Hoechst Roussel Agri-Vet) is used on fine quality turf postemergence crabgrass control. Acclaim is generally thought to be less phytotoxic and more efficacious with a single application than the organic arsenicals. The purpose of this trial was to evaluate MON 65134 0.172G and MON 65135 0.086G (dithiopyr, Monsanto Agricultural Co.), HOE-46360 69g/L EW and HOE-64360 80.5g/L EC (fenoxaprop, Hoechst Roussel Agri-Vet). Also evaluated were Dimension (dithiopyr, Monsanto), Acclaim, (fenoxaprop, Hoechst Roussel Agri-Vet), alone and in combination with preemergence herbicides. Tables 2 and 3 list herbicide rates and formulations. Herbicide applications were made at 2 stages of crabgrass growth. Early postemergence applications (1-4 leaf stage of crabgrass growth) were made to an improved Kentucky bluegrass turf grown on a silt loam soil. Late applications (1-4 tiller stage) were made to a Kentucky bluegrass turf grown on a heavy clay soil.

Early postemergence crabgrass control. Turfgrass injury was observed 10 days after early herbicide application (Table 2). Little to no injury was observed with Dimension applications and with Acclaim applications at 0.08 lb ai/A. At 10 days after application the best crabgrass control was found with Acclaim applied alone or in combination with preemergence herbicides. All treatments but Daconate 6 and Dimension @ 0.38 lb ai/A provided 90% or better crabgrass control 21 days after

application. It is possible that some crabgrass germinated on the site following herbicide applications. At 38 and 54 days after treatment it was the postemergence herbicides combined with preemergence herbicides or those with postemergence with some preemergence properties that performed the best.

Table 2. The evaluation of herbicides for postemergence control of crabgrass applied on 2 July at the 1 - 4 leaf stage of crabgrass growth.[1]

		Injury[2]	% Crabgrass Control[3]			
	Rate	7/12	7/12	7/23	8/9	8/25
Herbicides	lb ai/A	10 DAT	10 DAT	21 DAT	38 DAT	54 DAT
Acclaim 1EC	0.18	6.3ab	95.0cd	97.5c	82.7ab	80.0a
Acclaim 1EC + PreM 60WP	0.08 + 2.0	8.0bc	95.0cd	100.0c	99.1c	97.3c
Acclaim 1EC + PreM 60WP	0.125 + 2	6.7ab	95.0cd	100.0c	97.3c	95.1c
Acclaim 1EC + Barricade 65WG	0.08+0.75	8.0bc	95.0cd	100.0c	100.0c	99.6c
Acclaim 1EC + Barricade 65WG	0.125+0.75	6.7ab	97.5d	100.0c	100.0c	100.0c
Dimension 1EC	0.375	8.7c	62.4ab	78.8ab	76.4ab	84.0ab
Dimension 1EC	0.5	9.0c	36.6a	95.0c	88.2bc	92.0bc
MON 65135 0.086G	0.25	9.0c	67.4bc	90.0bc	89.1bc	96.4c
MON 65134 0.172G	0.375	9.0c	54.9ab	92.5bc	88.2bc	94.2bc
Daconate 6*	2 + 2	5.0a	64.9ab	66.3a	70.9a	77.8a
untreated	-	9.0c				

Late postemergence crabgrass control. Turfgrass injury was observed 26 days after application of herbicides on all plots (Table 3). Poor nitrogen fertilization and heavy clay soil at this site contributed to turfgrass injury. At 11 days after herbicide application all treatments but HOE 46360 0.67EC at 0.09 lb ai/A and Acclaim at 0.18 lb ai/A provided 50% or greater crabgrass control. At 26 days after application control with all treatments had improved.

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[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Injury evaluations are made on a scale of 1-9, where 9 = no visible injury to the plant and 1 = plant necrosis.

[3] Percent crabgrass control is determined by making a visual estimate of crabgrass cover in each treated plot and comparing this with the visual estimate found in the untreated plot. Crabgrass cover in the untreated plot averaged 13.3% on 7/12, 26.7% on 7/23, 36.7% on 8/09, and 75.0% on 8/25.

*The second application of Daconate 6 was made on 23 July.

Table 3. The evaluation of herbicides for postemergence control of crabgrass applied on 30 July at the 1 - 4 tiller stage of crabgrass growth.[1]

Herbicide	Rate lb ai/A	Injury[2] 8/25 26 DAT	% Crabgrass Control[3] 8/10 11 DAT	% Crabgrass Control[3] 8/25 26 DAT
Acclaim 1EC	0.18	7.3de	47.0ab	85.6ab
Acclaim 1EC	0.25	6.3cd	62.3bc	94.4b-d
Acclaim 1EC	0.36	4.0ab	78.8c	99.2d
HOE 46360 0.57EW	0.06	6.7cd	68.2bc	84.8a
HOE 46360 0.57EW	0.075	7.3de	52.9a-c	89.6a-c
HOE 46360 0.57EW	0.09	3.7ab	76.4c	98.4cd
HOE 46360 0.57EW	0.125	4.0ab	70.6bc	99.2d
HOE 46360 0.57EW	0.18	2.7a	68.2bc	99.2d
HOE46360 0.67EC	0.06	6.3cd	52.9a-c	84.0a
HOE 46360 0.67EC	0.075	5.3bc	62.3bc	87.2ab
HOE 46360 0.67EC	0.09	6.3cd	29.3a	91.2a-d
HOE 46360 0.67EC	0.125	6.7cd	70.6bc	98.4cd
HOE 46360 0.67EC	0.18	5.0bc	68.2bc	98.4cd
Untreated check		9.0e		

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Injury evaluations are made on a scale of 1-9, where 9 = no visible injury to the plant and 1 = plant necrosis.

[3] Percent crabgrass control is determined by making a visual estimate of crabgrass cover in each treated plot and comparing this with the visual estimate found in the untreated plot. Crabgrass cover in the untreated plot averaged 28.3% on 8/10 and 41.7% on 8/25.

Illoxan Applied to a Creeping Bentgrass Turf Mowed at 0.5 Inch

J.E. Haley, and D.J. Wehner

Research Protocol:	**Illoxan Applied to Creeping Bentgrass Turf Mowed at 0.25 Inch**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Penncross creeping bentgrass.
Application of Treatments:	date applied - July 30, 1993 all treatments; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa.
Plot Maintenance:	mowing height - 0.25 inch; pesticides - no additional pesticides; irrigation - to prevent stress; fertilization - 4 lbs N/M/yr; fungicides - as needed for disease prevention and control .
Experimental Design:	RCB; 3 replications.

Illoxan, also known as Hoelon 3EC, (diclofop-methyl, Hoechst-Roussel Agri-Vet) controls annual grassy weeds in wheat, barley, and soybeans. It is applied primarily as an early postemergence control to such sensitive and partially sensitive weeds as annual ryegrass (*Lolium miltiflorum*), crabgrass (*Digitaria* spp.) and giant foxtail (*Setaria faberii*).[1] Other research indicates that creeping bentgrass may be tolerant to illoxan. This study evaluates the sensitivity of creeping bentgrass mowed at 0.25 inch to this herbicide.

Six days after application no significant differences in injury were observed among treatments (Table 4). At 33 days following application no differences in quality were observed among treatments. The results of this year's test are similar to 1992 (refer to the *1992 Illinois Turfgrass Research Report*). In 1992 some injury to creeping bentgrass mowed at 0.5 inch was observed at the higher rates of illoxan. Temperature during this 1992 evaluation were much lower than during the 1993 trial. There has been some indication that cooler temperatures contribute to turf injury and that illoxan is less likely to injure turf during periods of high temperatures. The evaluation area was weed free so it is unknown if these illoxan rates would control crabgrass.

[1] For other sensitive weeds please consult the herbicide label.

Table 4. The evaluation of illoxan applied to a creeping bentgrass green.[1]

	Rate lb ai/A	Injury[ns] 8/05 6 DAT	Quality[ns] 9/01 33 DAT
Illoxan 3EC	0.38	9.0	4.7
Illoxan 3EC	0.5	9.0	4.7
Illoxan 3EC	0.63	9.0	4.3
Illoxan 3EC	0.75	9.0	4.3
Illoxan 3EC	0.88	7.3	4.3
Illoxan 3EC	1.0	8.3	3.7
Acclaim 1EC	0.036	8.3	3.7
Untreated	---	9.0	3.7

Lower Use Rates of Dimension through Tank Mixes with Other Herbicides

J.E. Haley and T.W. Fermanian

Research Protocol:	**Lower Use Rates of Dimension through Tank Mixes with Other Herbicides**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - April 23, 1993, liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa;
Turf Maintenance:	mowing height - 2.0 inches; pesticides - no additional pesticides; irrigation - little irrigation was necessary due to heavy rainfall in July; fertilization - none .
Experimental Design:	RCB; 3 replications.

Dimension 1EC (dithiopyr, Monsanto Co.) is labeled for both pre and postemergence control of crabgrass. In this evaluation Dimension application is combined with other preemergence herbicides in an effort to lower use rates and extend the window of control. Dimension was applied alone at 0.5 lb ai/A and at 0.125 or 0.25 lb ai/A in combination with Barricade 65WG (prodiamine, Sandoz Crop Protection), PreM 60DG (pendimethalin, LESCO Inc.), Balan 60DG (benefin, DowElanco), and Ronstar 50WP (oxadiazon, Rhone Poulenc). Rates of these herbicides are given in Table 5. No crabgrass germinated on the site, so the treatments could not be rated for efficacy. However, 131 days after herbicide application a difference in turf color was noted. Turf treated with tank mixes containing the higher rate of Barricade, Balan and PreM appeared darker green than turf treated with other

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[ns] Ns indicates that no significant difference was found among the means in this group of data at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

herbicides or lower rates (Table 5). The darker turf has probably been stressed by the higher rates of herbicide and is not growing as rapidly.

Table 5. The evaluation of Kentucky bluegrass color 131 days after herbicide application.[1]

Herbicide	Rate lbs ai/A	Color[2] 9/1/93 131 DAT
Barricade + Dimension	0.56 + 0.125	8.0d
Barricade + Dimension	0.38 + 0.25	6.7a-c
PreM + Dimension	1.7 + 0.125	7.3cd
PreM + Dimension	1.125 + 0.25	6.3ab
Balan + Dimension	2.25 + 0.125	8.0d
Balan + Dimension	1.5 + 0.25	6.7a-c
Ronstar + Dimension	2.25 + 0.125	6.7a-c
Ronstar + Dimension	1.5 + 0.25	7.0bc
Dimension	0.5	6.7a-c
Untreated		6.0a

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Color evaluations are made on a scale of 1-9 where 9 = very dark green, 5 = pale green, and 1 = straw color.

BROADLEAF WEED CONTROL RESEARCH AT THE UNIVERSITY OF ILLINOIS

Broadleaf weeds compete with turfgrass for water, light, space and nutrients. They reduce the aesthetic quality of the turf and are often symptomatic of an underlying problem (soil compaction, poor nutrition etc.).

Preemergence Broadleaf Weed Control

J.E. Haley and D.J. Wehner

Research Protocol:	**Preemergence Broadleaf Weed Control**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - April 28, &Sept 29, 1992, April 22, 1993; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa.
Plot Maintenance:	mowing height - 2.5 inches; pesticides - all plots were treated with Trimec to kill existing weeds; irrigation - none; fertilization - none;
Experimental Design:	RCB; 3 replications.

Traditionally, postemergence herbicides are used to control broadleaf weeds in turf. Some herbicides that prevent crabgrass germination will also prevent select broadleaf weeds such as yellow wood sorrel (*Oxalis stricta*), prostrate spurge (*Euphorbia humistrata*), and chickweed (*Cerastium vulgate* and *Stellar media*). However, with the development of preemergence herbicides that control a wider spectrum of weeds, many turf managers have, in recent years, turned to preemergence herbicides for broadleaf weed control. Gallery (isoxaben, DowElanco) is labeled to control over 40 broadleaf weed and annual grass species with preemergence applications to cool and warm season turfgrass. In two separate trials, Gallery rates and application timing were evaluated along with Barricade (prodiamine, Sandoz Crop Protection). Rates and timing are presented in Tables 1 and 2.

The most common weeds found on the test sites were dandelion (*Taraxacum officinale*) and white clover (*Trifolium repens*). Existing weeds were killed with Trimec. In the first evaluation, data collected in 1993 indicate that good control of spring germinating broadleaf weeds is found with either a 1992 fall or 1993 spring application of Gallery (Table 1). This does not support 1992 data where applications made the previous fall did not provide enough control of the spring broadleaf weeds (refer to *1992 Illinois Turfgrass Research Report*). No significant crabgrass control could be found with applications of Gallery or Trimec.

In the second, trial no significant difference in dandelion or clover control was found among treatments (Table 2). Significant difference was found in crabgrass populations among treatments. All Barricade treatments provided 90% or better crabgrass control. The single application of Gallery partially controlled crabgrass.

Table 1. The evaluation of Gallery and Barricade applications made to Kentucky bluegrass from spring 1992 to spring 1993, evaluated on August 10, 1993.[1]

	Rate	Application	% Control 119 DAT[2]		
Herbicide	lbs ai/A	Timing	Dandelion	Clover	Crabgrass
Barricade 65WG	0.65	spring 92	6.4a	46.7a	57.8b
Barricade + Gallery	0.49 + 0.75	spring 92	36.5b	60.0ab	53.8b
Gallery 75DF	1.0	fall 92	96.0c	88.0bc	0.0a
Gallery / Gallery	0.75 / 0.75	fall 92 / spirng 93	96.0c	100.0c	13.3a
Trimec	3.0 pt cf/A	spring 92 / fall 92 / spring 93	96.0c	100.0c	0.0a

Table 2. The evaluation of Gallery and Barricade applications made to a Kentucky bluegrass turf on April 22, 1993, evaluated August 10, 1993.[1]

	Rate	% Control 119 DAT[2]		
Herbicide	lb ai/A	Dandelion	Clover	Crabgrass
Barricade 65WG	0.5	64.6	69.7	98.4b
Barricade 65WG	0.65	54.2	69.7	98.9b
Barricade 65WG	0.75	45.8	36.4	91.6b
Barricade / Barricade	0.65/0.16	58.3	69.7	99.5b
Barricade + Gallery 75DF	0.49+0.75	58.3	49.5	96.8b
Gallery 75DF	0.75	54.2	56.6	63.1a

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Percent control is determined by making a visual estimate of weed cover in each treated plot and comparing this with the visual estimate found in the untreated plot. Crabgrass cover in the untreated plot averaged 16.7%, clover cover in the untreated plot averaged 41.7% and dandelion cover in the untreated plot averaged 16.7%.

Postemergence Broadleaf Weed Control

J.E. Haley , D.J. Wehner and T.W. Fermanian

Research Protocol:	**Postemergence Broadleaf Weed Control**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - May 27, 1993; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa; granular materials - applied by hand.
Plot Maintenance:	mowing height - 2.5 inches; pesticides - no additional pesticides; irrigation - none; fertilization - none.
Experimental Design:	RCB; 3 replications.

Many of the available postemergence herbicides will kill a variety of broadleaf weeds. These herbicides are often a combination of several active ingredients and are found in a variety of formulations. The trend in postemergence broadleaf herbicides has been toward development of safer formulations. Many of these are granular formulations in combination with fertilizers. The purpose of this research was to evaluate 2 granular formulations and compare them to similar liquid formulations of postemergence herbicides. Herbicides included in this evaluation were Confront, liquid formulation and a granular formulation combined with fertilizer (triclopry and clopyralid, DowElanco), Turflon Ester 4EC (tricloypry, DowElanco), plus Trimec Classic (2,4-D, MCPP and dicamba, P.B.I. Gordon), and Turf Builder+2 (2,4-D and MCPP plus fertilizer, The Scott Company).

Broadleaf weeds found at the site included dandelion (*Taraxacum officinale*), white clover (*Trifolium repens*) and plantains (*Plantago* spp.). White clover control was good to excellent on all evaluation dates (Table 3). At 18 DAT, dandelion control was was good to excellent, however, the granular materials appeared slower to control this weed. Data indicate that by 29 DAT the granular materials were controlling dandelions as well as the sprayable herbicides (Table 4). Excellent plantain control was obtained with all herbicides (Table 5).

Table 3. The evaluation of herbicides applied May 27 for postemergence control of white clover.[1]

Herbicide	Rate lb ai/A	Clover Control[2] 6/14 18 DAT	6/25 29 DAT	7/08 42 DAT	8/10 75 DAT
Confront	0.75	2.0a	1.0a	1.0a	1.0a
Turflon Ester + Trimec Classic	0.5 + 3.25 pt cf/A	2.3a	1.0a	1.0a	1.0a
Confront on fertilizer	0.75	2.7ab	1.0a	1.0a	1.0a
Scott's Turf Builder Plus 2	3.0	3.3b	1.7b	2.0bc	1.3a
untreated	-	9.0c	9.0c	9.0c	9.0b

Table 4. The evaluation of herbicides applied May 27 for postemergence control of dandelion.[1]

Herbicide	Rate lb ai/A	Dandelion[2] 6/14 18 DAT	6/25 29 DAT	7/08 42 DAT	8/10 75 DAT
Confront	0.75	1.7a	1.0a	1.0a	1.0a
Turflon Ester + Trimec Classic	0.5 + 3.25 pt cf/A	1.7a	1.0a	1.0a	1.0a
Confront on fertilizer	0.75	3.0b	1.7a	1.7a	2.3b
Scott's Turf Builder Plus 2	3.0	2.0ab	1.7a	1.3a	1.7ab
untreated	-	9.0c	9.0b	9.0b	9.0c

Table 5. The evaluation of herbicides applied May 27 for postemergence control of plaintan.[1]

Herbicide	Rate lb ai/A	Plantain[2] 6/25 29 DAT	7/08 42 DAT
Confront	0.75	1.0a	1.0a
Turflon Ester + Trimec Classic	0.5 + 3.25 pt cf/A	1.0a	1.0a
Confront on fertilizer	0.75	1.0a	1.0a
Scott's Turf Builder plus 2	3.0	1.0a	1.0a
untreated	-	9.0b	9.0b

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] All weed control evaluations are made on a scale of 1-9, where 9 = no control of the weed species indicated and 1 = no weeds present. A rating of 5 would indicate some injury to the weed or total control of some of the weeds but little control of others.

WEED CONTROL RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY

Long-Term Pre- and Postemergent Control of Turfgrass Weeds by Preemergent Herbicides

K.L. Diesburg

Research Protocol:	**Long-Term Pre- and Postemergent Control of Turfgrass Weeds with Preemergent Herbicides**
Site:	Southern Illinois University, Carbondale, IL; turf species - tall fescue; plot size - 5'x 5'.
Treatments:	granular materials - salt shaker type; liquid materials - CO_2 hand-held boom at 30 psi and 150 gal/A; timing - 1st application immediately prior to crabgrass seed germination, April 22; 2nd application on May 17; 3rd application on August 22.
Plot Maintenance:	mowing height - $2^1/_4$ inch; fertilization - 3 lbs N/M/yr; other pesticides - none.
Experimental Design:	RCB; 3 replications.

The purpose of this evaluation was to compare the efficacy of some experimentals and some unique combinations of herbicides on season-long preemergent and early postemergent control of crabgrass. Treatment application dates were designed to compare control of crabgrass with applications as preemergent (April 22), early postemergent (May 17), and early postemergent plus late summer postemergent (May 17/August 22).

Dimension and Drive at 0.5 lb ai/M applied at the preemergent stage on April 22 were the only compounds unable to hold back the crabgrass for the full season (Table 1). High rates of Pre-M and Ronstar late summer application of Barricade and mixtures of postemergent herbicides with early postemergent application on May 17 were highly effective. Table 2 shows that Drive was very effective at controlling white clover. Nutsedge was able to grow in plots where the white clover was inhibited from dominating the canopy. Apparently some of the treatments that were more effective in controlling crabgrass also inhibited brown patch.

Table 1. Crabgrass presence in tall fescue turf.[1]

Herbicide[2]	Rate lb ai/A	% Presence July 9	August 13	Sept. 17	Avg
Ronstar 2G	4	0	0	0	0
Barricade/[3]Barricade	0.65/0.325	0	0	0	0
Acclaim +[4] Barricade[5]	0.125+0.75	0	1	0	0
Pre-M 60WP	4	0	0	2	1
Acclaim + Pre-M[5]	0.1+2.0	0	0	2	1
Barricade 65WG	0.65	0	1	2	1
Dacthal + Daconate 6[5]	10.5+1.0	0	1	4	2
Dimension + Daconate 6[5]	0.5+2.0	0	4	3	2
Acclaim + Pre-M[5]	0.125+2.0	0	0	9	3
Barricade/Barricade	0.5/0.25	0	14	3	5
Dimension[5]	0.5	0	1	17	6
MON 65135	0.25	0	7	16	7
Barricade	0.38	3	5	18	9
Balan 2G	3.0	0	4	22	9
Dimension + Daconate 6[5]	0.25+2.0	1	1	28	10
Acclaim + Barricade[5]	0.1+0.75	0	7	25	11
Pre-San	2.5	0	5	31	12
Barricade	0.5	0	10	30	13
Barricade	0.75	4	7	34	15
Dimension	0.5	1	28	67	32
UTC		20	44	90	51
Drive[5]	0.5	11	94	100	68
$LSD_{0.05}$		8	18	42	19

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Unless otherwise noted all applications were made April 22.

[3]'/' denotes second application on August 22.

[4]'+' denotes mixture of herbicides.

[5]Applied as an early postemergent May 17.

Table 2. Other effects of herbicides on tall fescue turf.[1]

Herbicide[2]	Rate lb ai/A	% Presence White Clover July 9	% Presence Brown Patch Aug 13	% Presence Nutsedge Sept 17
Drive[3]	0.5	0	52	18
UTC		37	20	7
Dimension + Daconate 6[3]	0.25+2.0	41	39	7
Dimension + Daconate 6[3]	0.5+2.0	52	37	15
MON 65135	0.25	53	17	5
Acclaim +[4] Barricade[3]	0.125+0.75	56	33	1
Dimension[3]	0.5	56	14	4
Barricade	0.5	58	17	2
Barricade	0.75	58	30	5
Dimension	0.5	58	11	6
Barricade/Barricade	0.5/0.25	59	14	3
Balan 2G	3.0	62	4	6
Barricade 65WG	0.65	64	14	4
Acclaim + Barricade[3]	0.1+0.75	65	14	8
Acclaim + Pre-M[3]	0.1+2.0	66	34	1
Ronstar 2G	4	67	8	2
Pre-San	2.5	67	12	6
Pre-M 60WP	4	71	4	3
Barricade	0.38	73	6	2
Acclaim + Pre-M[3]	0.125+2.0	77	9	3
Barricade/[5]Barricade	0.65/0.325	82	4	3
Dacthal + Daconate 6[3]	10.5+1.0	82	13	2
$LSD_{0.05}$		42	30	14

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Unless otherwise noted all applications were made April 22.

[3]Applied as an early postemergent May 17.

[4]'+' denotes mixture of herbicides.

[5]'/' denotes second application on August 22.

TURFGRASS NUTRIENT RESEARCH AT THE UNIVERSITY OF ILLINOIS

Evaluation of Nature Safe Fertilizer on Creeping Bentgrass

D. J. Wehner and J. E. Haley

Interest in natural organic fertilizers has increased in the last several years. Natural organics usually consist of waste products such as sewage sludge or byproducts from the plant and animal processing industry. These fertilizers generally contain a portion of their nitrogen in a slow release form. The purpose of this study was to compare the color and clipping production of creeping bentgrass fertilized with Nature-Safe (10-2-8), a product from Griffin industries, to that from turf fertilized with IBDU (21-3-16, 50% IBDU) and Nutralene (40-0-0, with P & K added to plot to provide a 4-1-2 ratio).

Research Protocol:	**Nature Safe Evaluation**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Penncross creeping bentgrass (*Agrostis palustris L.*).
Treatments:	Nature Safe (10-2-8), IBDU (21-3-16, 50% IBDU), Nutralene (40-00, with P + K added to plot give a 4-1-2 ratio); rates - each material applied at 0.5 lb N/M/ month and Nature Safe also at 1.0 lb N/M /month.
Application of Treatments:	Treatments were made on June 21, July 21, August 24, and October 4, 1993; Treatments applied by hand to 3 ft x 10 ft plots.
Plot Maintenance:	Mowing - height 3/16." Plots mowed twice per week with clippings collected from plots on second mowing; fungicide applications - to prevent serious damage to turf; disease severity rated as it occurred, and then, fungicide was applied; irrigation - to maintain growth.
Experimental Design:	RCB; 3 reps.

Because of the very wet weather during the course of the 1993 growing season, differences between the untreated turf and turf receiving fertilizer were less than what would normally be expected. This study was conducted on bentgrass growing on a good quality mineral soil rather than a sand based soil where differences due to absence of fertilization would be more severe. The clipping weight data collected from the plots is presented in Table 1. As expected, the high rate of Nature Safe resulted in higher clipping weights than did the other treatments, and the untreated turf produced the lowest clipping weights. The differences in weight due to treatments were statistically significant on five of the 13 collection dates. The 0.5 lb N/M treatments produced similar clipping weights throughout the season.

The color rating data for this evaluation is presented in Table 2. Significant differences in color were found on four of the 14 rating dates. On these dates, the color

rating for the untreated turf was significantly lower than the ratings for the fertilized turf. No significant differences were found in the occurrence of diseases on these plots (data in Table 3). There was a trend for dollar spot to be more severe during September on the untreated turf. Dollar spot is known to be more of a problem under low fertility conditions.

Table 1. Fresh clipping weight of creeping bentgrass turf expressed as grams fresh weight per 14.97 sq ft.[1]

	Nitrogen	Weight (grams/14.97 sq ft)					
	lb/M	6/24	7/06	7/09	7/20	7/27	7/29
Nature Safe	0.5	8.6bc	40.5bc	15.1	34.4	78.5a-c	27.5
Nature Safe	1.0	9.8c	51.1c	11.7	30.1	89.3bc	22.9
21-3-16	0.5	6.0ab	50.6c	12.2	41.2	97.2c	24.8
50% IBDU Nutralene with P + K	0.5	4.7a	35.7ab	9.3	35.9	76.5ab	20.1
Untreated	-	5.8a	26.8a	10.3	30.0	62.5a	17.0

(continued)

Table 1. Fresh clipping weight of creeping bentgrass turf expressed as grams fresh weight per 14.97 sq ft.[1] *(continued)*

	Nitrogen	Weight (grams/14.97 sq ft)						
	lb/M	8/05	8/13	8/19	9/10	9/24	10/08	10/14
Nature Safe	0.5	10.2	18.5	5.1a	13.4ab	24.6	10.4	4.2
Nature Safe	1.0	9.1	26.0	8.1b	19.8c	23.8	13.8	4.4
21-3-16	0.5	9.0	19.5	5.4a	15.5bc	20.0	8.0	4.8
50% IBDU Nutralene with P + K	0.5	8.9	20.3	5.2a	13.2ab	17.6	9.7	4.9
Untreated	-	7.7	17.7	3.6a	10.0a	16.0	7.4	4.0

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

Table 2. Color evaluation of creeping bentgrass turf fertilized with nitrogen.[1]

	Nitrogen	Color[1]						
	lb/M	6/30	7/08	7/15	7/22	7/29	8/05	8/16
Nature Safe	0.5	7.0	7.7	7.7	7.0	7.0	6.0	6.7bc
Nature Safe	1.0	7.0	8.0	8.0	6.7	7.0	6.7	7.0c
21-3-16	0.5	7.0	7.7	7.7	7.0	7.0	6.0	6.0ab
50% IBDU Nutralene with P + K	0.5	7.0	7.3	7.3	6.7	7.0	6.0	6.3bc
Untreated	-	6.0	7.0	7.0	6.7	7.0	5.7	5.3a

(continued)

Table 2. Color evaluation of creeping bentgrass turf fertilized with nitrogen.[2] *(continued)*

	Nitrogen	Color[2]						
	lb/M	8/23	9/01	9/09	9/16	9/23	9/30	10/12
Nature Safe	0.5	7.0	6.7	6.3	7.0b	6.7	6.3bc	7.0b
Nature Safe	1.0	6.3	7.0	6.7	7.7b	7.0	6.7c	7.0b
21-3-16	0.5	5.7	6.7	6.3	7.0b	6.7	6.7c	7.3b
50% IBDU Nutralene with P + K	0.5	6.3	6.7	6.7	7.3b	6.7	6.0ab	7.3b
Untreated	-	6.0	6.0	6.3	6.0a	5.7	5.7a	6.0a

Table 3. Disease evaluation of creeping bentgrass turf fertilized with nitrogen.

	Nitrogen	Brown Patch[3]		Dollar Spot[2]		
	lb/M	7/23	7/29	7/29	9/01	9/30
Nature Safe	0.5	6.3	6.0	5.7	4.0	4.7
Nature Safe	1.0	4.3	4.0	6.3	4.0	5.0
21-3-16	0.5	5.3	4.7	5.7	2.7	4.3
50% IBDU Nutralene with P + K	0.5	5.7	4.7	5.7	4.0	4.3
Untreated	-	5.3	4.7	6.0	3.0	3.7

[1] Color evaluations are made on a scale of 1-9 where 9 = very dark green, 5 = pale green, and 1 = straw color.

[2] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[3] Disease evaluations are made on a scale of 1-9 where 9 = no disease visible and 1 = turf necrosis as a result of disease infection.

TURFGRASS NUTRIENT RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY

Comparison of Single and Multiple Application of Low Analysis Fertilizers on Kentucky Bluegrass

K.L. Diesburg

Research Protocol:	**Comparison of Single and Multiple Application of Low Analysis Fertilizers on Kentucky Bluegrass**
Location:	Southern Illinois University, Carbondale, IL.
Site:	soil - Hosmer silt clay loam; cultivar - Ikone.
Application of treatments:	A total of 3 lb N/M/yr; 1st application on May 21; 2nd application on June 3; 3rd application on September 4; 4th application on October 29.
Plot Maintenance:	mowing height - 2.25 inches; pesticides - preemergent in April and June, Ronstar and Dacthal; postemergent in March and October, Turflon D; irrigation - none.
Experimental Design:	RCB; 3 replications.

In an effort to limit labor expense, attempts are being made to supply the full annual dose of nitrogen to turf in one application. Low analysis fertilizers have low potential for 'burning' turf because a large portion of the nutrients are released very slowly and the portion of rapidly released nutrients is low. Resin-coated, and plastic-coated fertilizers are coated so precisely that a fairly uniform release of nitrogen and other elements can be accomplished over a long period of time. This study was initiated in 1993 and will continue at least through 1994 to evaluate on a monthly basis the quality of Kentucky bluegrass turf and the soil beneath in respone to single and multiple application of these kinds of fertilizers. There is the question of how turfgrass quality is maintained through stress periods and how well it recovers after stress periods with fertilizers that have been applied several months, previously.

In 1993 turf quality is the only data to have been recorded. Soil strength will be evaluated in spring 1994 soon after the first application of fertilizer for that season. Differences among treatments were greatest during the cooler months, June and September. Variability among replication within treatments was greater during the summer months, but this did not affect the average ranking of treatments.

Table 1. Performance of 'Ikone' Kentucky bluegrass in response to fertilizers.[1]

Fertilizer	Rate lb N/M	Quality[2] 6/12	7/6	8/3	9/14	Avg
Nurture Regular Care (22-2-3)	1.50[3]	8.7	6.5	8.5	7.7	7.8
Nurture Intensive Care (12-3-9)	1.50	8.3	7.5	8.0	7.5	7.8
Milorganite (6-2-0)	3.00[4]	8.2	7.0	8.0	7.3	7.6
Nurture Intensive Care (12-3-9)	0.75[5]	9.0	6.7	8.3	6.7	7.7
Nurture Regular Care (22-3-9) / Nurture Soil Builder (6-0-0)	0.95 / 0.05	8.9	7.0	8.2	6.0	7.5
Scott Turf Builder (29-3-4) / Nurture Soil Builder (6-0-0)	0.95 / 0.05	8.8	6.8	7.0	7.3	7.5
Performax (14-0-4)/urea (46-0-0)	0.1875 cf / 0.98[6]	8.3	8.0	8.2	5.5	7.5
Nurture Thatch Attack (24-0-0) / urea (46-0-0)	1.00[d]	8.2	7.7	8.3	5.2	7.3
Nurture Lawn Food (20-2-3)	0.75	8.7	6.7	7.7	6.2	7.3
Scott Turf Builder (29-3-4)	1.00	8.3	6.7	7.3	6.3	7.2
Nurture 9-3-7	1.00	8.0	7.5	7.7	5.0	7.1
Maxiplex (x) / urea (46-0-0)	0.75 cf /1.00	7.9	6.5	7.2	6.7	7.0
Nurture Lawn Food (20-2-3)	1.00	8.6	6.3	7.8	5.2	7.0
Scott NPK Fertilizer (21-3-20)	1.00	8.0	7.7	7.5	4.7	7.0
Nitroform 38-0-0	3.00	7.2	7.8	7.8	5.0	7.0
Performax (14-0-4) / Rennaissance (12-0-4) / urea (46-0-0)	0.125 cf / 0.09 cf / 0.98	8.6	6.2	7.5	5.2	6.9
Urea experimental (46-0-0)	1.00	7.8	6.7	7.0	5.8	6.8
Urea experimental (46-0-0)	1.00	8.3	6.8	7.7	4.5	6.8
Scott Turf Nitrogen (40-0-0)	1.00	8.2	6.5	7.5	5.0	6.8
Nurture (16-4-6)	1.00	7.8	6.7	7.2	5.5	6.8
Scott Super Turf Fertilizer (26-4-12)	1.00	7.6	7.0	7.5	5.0	6.8
Scott Lawn Reviver (9-2-4)	1.00	7.0	7.3	7.7	5.0	6.8
$LSD_{0.05}$		1.5	1.9	1.8	2.2	1.3

(continued)

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3] This material was applied twice during the growing season, in May and October.

[4] This material was applied once during the growing season, in May.

[5] This material was applied four times during the growing season, in May, June, September, October.

[6] This material was applied three times during growing season; May, June, October.

Table 1. Performance of 'Ikone' Kentucky bluegrass in response to fertilizers.[1] *(continued)*

Fertilizer	Rate lb N/M	Quality[2] 6/12	7/6	8/3	9/14	Avg
Performax (14-0-4) / Knife (x) / Rennaissance (12-0-4) / urea (46-0-0)	0.125 cf / 0.09 cf / 0.09 cf / 0.97	8.5	6.7	6.7	5.0	6.7
Urea experimental (46-0-0)	1.00	8.7	6.7	6.7	4.7	6.7
Nutralene (40-0-0)	3.00	7.5	6.7	6.5	6.0	6.7
Nuture (12-3-9)	1.00	8.0	7.3	7.2	3.8	6.6
Nurture Soil Builder (6-0-0) / urea (46-0-0)	0.02/0.98	7.7	7.0	7.2	4.3	6.5
Nurture Soil Builder (6-0-0)	0.05	7.4	6.5	7.0	5.2	6.5
Nurture Regular Care (22-2-3)	0.75	6.9	5.3	7.0	6.8	6.5
Nurture Regular Care (22-2-3)	1.00	7.2	6.0	6.3	5.7	6.3
Untreated check		5.8	5.8	7.3	5.3	6.1
Once (24-6-10)	3.00	7.4	6.7	6.3	3.7	6.0
SCU (37-0-0)	1.00	6.2	7.2	6.2	4.0	5.9
$LSD_{0.05}$		1.5	1.9	1.8	2.2	1.3

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Effects of Nutrient Sources, Biostimulants, and Soil Modifiers on Zoysiagrass (Zoysia japonica) Turf Quality

K.L. Diesburg

Research Protocol:	**Effects of Nutrient Sources, Biostimulants, and Soil Modifiers on Zoysiagrass Turf Quality**
Site:	Southern Illinois University, Carbondale, IL; turf - Korean Common zoysiagrass; soil - Hosmer silt clay loam, 3% slope, nutrient depleted; plot size - 5'x 5'.
Application of Treatments:	date applied - June 3, July 22, August 24; liquids materials - CO_2 backpack sprayer; spray volume - 150 gpa; granular materials - salt-shaker type; Terra-Sorb - slit-seeder at 0.5 inch.
Turf Maintenance:	mowing height - 1.5 inches; pesticides - Ronstar in April, Trimec Plus in July; irrigation - none.
Experimental Design:	RCB; 4 replications.

The turf industry is being pressured by government agencies, as well as consumers to reduce environmental pollutants associated with its activities. To assist in this struggle some manufacturers have introduced products that claim to make better use of resources by controlling nutrient release, improving turfgrass growth, or improving soil conditions. Included in this evaluation are materials that contain coated fertilizer particles (SCU, ONCE) or large N-containing molecules (Ringer, IBDU, Coron, Nitroform, Nutralene). It is hoped that these materials will control nutrient release and allow the turfgrass plant to more efficiently use the available nutrients and prevent fertilizer run-off. Products called biostimulants, mixtures of growth hormones and macro- and micronutrients, are thought to improve turfgrass root growth, crown density, and/or vegetative color with minimal stimulation of leaf elongation. Products like Naiad and Turf-tech might temporarily improve cation exchange capacity of soil, allowing more efficient nutrient uptake by roots. All of these approaches imply less use of conventional fertilizers resulting in less nitrates and salts released into surface and ground water. The added economic advantage of potentially fewer mowings per season is viewed as meeting the demand and justifying the development of these new products.

The initial purpose for this experiment is to put many of these new products (Table 2) into the same management environment in order to determine their relative effects on turf quality. The long-term goal is to compare changes in soil properties after several years of treatment and correlate the soil data with the turfgrass quality data.

The summer weather this year was a contrast to that of 1992. Last year dry, cool conditions dominated the trial from December 1991 through August 1992 with an average of 0.7 inches of precipitation per month. This year rain was plentiful through the summer except for parts of July and August, with normal hot temperatures.

Table 2. Treatments applied to mature Korean Common turf.

Treatment	Supplier	Rate[1] lb/M
Nutrient		
Nurture, Intensive Care (12-3-9)	Toro	1 N
Nurture, Intensive Care (9-3-7)	Toro	1 N
Nurture, Regular Care (22-2-3)	Toro	1 N
(24-4-12)	Wilbur Ellis	1 N
Urea (46-0-0)		1 N
Sulphur-Coated Urea (SCU 37-0-0)		1 N
Triple-Super-Phosphate (0-46-0)		1 P
Potassium Chloride (0-0-60)		1 K
Sprint (10% iron chelate)	Ciba	0.2 Fe
SCU + Spring		1 N + 0.2 Fe
Esmigran (micro.)(0.02% Fe)	Mallinkrodt	4 mat (0.2 Fe)
SCU + Esmigran		1 N
Ferromec (15-0-0) + urea	PBI Gordon	1 N + 0.1 Fe
(18-4-10)	Lebanon	1 N
(18-4-10) + Naiad	Lebanon	1 N + 0.063
(10-2-6) animal by-product	Ringer	1 N
IBDU (20-0-16)	Par-Ex	3 N
Once (24-0-0) resin-coated	Grace-Sierra	3 N
(28-0-0) formolene	Coron	1 N
Nitroform (38-0-0) long UF	NorAm	3 N
Nutralene (40-0-0) short UF	NorAm	3 N
Milorganite (6-2-0)processed sewage sludge	MilwaukeeMet. Sewerage Dist.	3 N
Turf Builder (29-3-4)O.M.	Scott	1 N
Milorganite + Nutralene		1.5 + 1.5 N
Biostimulants		
Turf-tech II cyanobacteria	AgriTech	0.257 material
Turf-tech II + Nutralene		0.257 + 3 N
Bova Mura (5-0-0)(cow manure base)	PBI Gordon	1 N
Bova Mura (5-0-0)(cow manure base)	PBI Gordon	0.6 mat.(0.03 N)
Sand-Aid sea plant meal	Emerald Isle	10 material
Sand-Aid + Milorganite		10 mat.+3 N
Per4max + Urea	Floratine	0.1875 mat.+1 N
Per4max + Renaissance	Floratine	0.125+0.09 +1 N
Knife + Per4max + Renaissance + Urea		0.09+0.13+0.09+1N
Soil Modifiers		
Maxiplex (humates) + Urea	Floratine	0.75 mat. + 1 N
Maxiplex	Floratine	0.75 mat.
Terra-Sorb (into core holes) + Milorganite		3 material + 3 N
polyacrylamide gel	Indust Srvcs Int.	
Nurture, Soil Builder	Toro	0.21 mat.

[1] All 1 N rates were applied on three different dates approximately one month apart. All 3 N rates were applied once on the date of first treatment.

Nutrients. Materials have slow release rates of nitrogen were favored this year because of the excessive rains. The soil was at or above field capacity moisture much of the summer. Any material having highly water soluble nitrogen would be leached away with the next rain. The slow release materials, however, had nitrogen held in reserve to be released after each rain. As a result, any material in this experiment having urea resulted in lower turfgrass quality.

Biostimulants and Soil Modifiers. This experiment has not been designed to determine the degree of turfgrass quality improvement in a given year attributable to a soil modifier or specific components within the biostimulant mixtures. Rather, long-term benefits to the soil and turfgrass rooting from these products will be determined in the future.

Table 3. Zoysia turf quality and color in response to nutrient sources, biostimulants, and soil amendments[1].

Treatment	Turf Quality Ratings[2]			
	7/7	8/13	9/17	Avg
Nutrients				
Terrasorb + Milorganite	7.8	9.0	8.3	8.3
Once Grace-Sierra	9.0	8.3	7.3	8.2
Milorganite + Nutralene	7.3	8.5	8.0	7.9
Ferromec	6.8	8.5	7.5	7.6
Urea Formaldehyde Nitroform	8.3	7.5	6.5	7.4
SCU + Sprint (Fe)	6.5	8.5	7.3	7.4
22-2-3 Nurture	7.3	7.8	6.3	7.1
Nutralene	8.5	7.3	5.5	7.1
12-3-9 Nurture	7.0	7.5	6.8	7.1
Milorganite	7.8	7.8	5.5	7.0
29-3-4 Turf Builder	7.0	8.0	5.8	6.9
18-4-10 Lebanon	6.8	7.5	6.5	6.9
IBDU ParEx	8.5	6.3	5.8	6.8
Urea	6.5	8.3	5.5	6.8
SCU	6.8	7.5	5.5	6.6
10-2-6 Ringer	7.5	6.3	5.8	6.5
SCU + Esmigran	7.3	6.8	5.3	6.4
9-3-7 Nurture	5.3	7.3	5.8	6.1
Formolene Coron	6.5	6.3	5.3	6.0
24-4-12 Wilbur Ellis	6.0	6.5	4.8	5.8
18-4-10 + Naiad	5.5	5.8	4.3	5.2
Sprint (Fe)	4.8	4.8	4.3	4.6
Potassium Chloride	4.3	5.0	4.5	4.6
Micronutrients Esmigran	3.8	4.5	4.0	4.1
Triple-Superphos	4.0	3.8	3.5	3.8

(continued)

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2]Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

Table 3. Zoysia turf quality and color in response to nutrient sources, biostimulants, and soil amendments[1]. *(continued)*

Treatment	Turf Quality Ratings[2]			
	7/7	8/13	9/17	Avg
Biostimulants				
Per4max + Urea	6.5	4.8	5.5	5.6
Knife+Per4max+Renaissance+Urea	6.0	5.0	4.8	5.3
Bova Mura (1 N)	5.8	5.8	4.3	5.3
Per4max + Renaissance + Urea	7.0	4.8	4.0	5.3
Bova Mura	4.5	4.5	3.8	4.3
Soil Modifiers				
Sand-Aid + Milorganite	8.0	8.3	8.0	8.1
Turf-tech + Nutralene	9.0	7.5	6.0	7.5
Soil Builder Nurture	6.0	6.5	5.0	5.8
Maxiplex + Urea	6.0	4.5	4.3	4.9
Sand-Aid	4.3	4.8	4.3	4.4
Maxiplex	4.0	4.5	3.3	3.9
Turf-tech	3.5	3.8	2.3	3.2
Nontreated Control	4.5	4.0	3.0	3.8
$LSD_{0.05}$	1.3	1.5	1.7	1.0

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

GROWTH RETARDANT RESEARCH AT THE UNIVERSITY OF ILLINOIS

Evaluation of Primo Applied to Kentucky Bluegrass Turf

T.W. Fermanian and J.E. Haley

Mowing continues to use the greatest number of resources in a turf management program. Kentucky bluegrass turfs, particularly in early spring, have a high mowing requirement. The use of plant growth regulators (PGRs) can help to slow down the vertical expansion of bluegrass turfs and minimize this mowing requirement. A new plant growth regulating material, Primo (trimexapac ethyl, Ciba Giegy Corporation), is being investigated for its ability to reduce vertical growth of Kentucky bluegrass. Also included in this evaluation were Cutless 50WP (flurprimidol, DowElanco), and Scott's TGR 2FL (paclobutrazol, The Scotts Company.

Research Protocol:	**Evaluation of Primo Applied to Kentucky Bluegrass Turf**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Turf:	Kentucky bluegrass.
Application of Treatments:	date applied - May 26, 1993, all treatments reapplied to same plots - July 22, 1993; liquid herbicides - applied with a CO_2 backpack sprayer; spray volume - 40 gpa;
Turf Maintenance:	mowing height - 2 inches, mowed weekly, fresh weight taken for each plot. pesticides - no additional pesticides; irrigation - little irrigation was necessary due to heavy rainfall in July;
Experimental Design:	RCB; 3 replications.

On each evaluation date, data were recorded for general turf quality (Table 1). Evaluations were made on a scale of 1 to 9 with one equaling dead turf and 9 equaling the darkest possible turf. Plots were also evaluated for fresh weight production on 8, 15, 22, 29, 43, 57, 64 days after treatment, and 6, 14, and 40 days after the second application (Table 2).

All treatments, with the exception of Cutlass at 1.25 lbs ai/A, showed a significant reduction in fresh clippings eight days after the initial treatment. This trend continued until at least 29 days after treatment. The Cutlass plots showed significant reduction at 15 days after treatment and continued to show reduced production until 43 days after treatment. At the 57 and 64 day after treatment evaluations, there was no significant differences found among any of the treatments and the untreated. A second application to the same plots showed significant reduction for all Primo treatments, but no reduction for either Cutlass or Scott's TGR at 0.5 lb ai/A at six days after treatment for all plots, but no significant differences were found 40 days after the second application.

A significant reduction in quality was found for all four Primo treatments evaluated from 12 days after treatment through 19 days after treatment (Table 2). The 0.5 oz cf/M rate of Primo showed no significant difference at 26 days after treatment, but higher rates and the 25WP formulation showed a significant reduction in quality at 12 days after treatment

through 26 days after treatment. The quality evaluations of Primo 1EC at 0.75 oz cf/M were considered below commercial standards for turfgrass quality until 50 days after treatment. From 50 days after treatment until the final evaluation at 64 days after treatment, no significant reduction in quality was found for any of the Primo treatments. At 64 days after treatment the Primo treatments showed a significant increase in quality over the untreated plots. A significant reduction in quality for Primo treated turf was also seen 17 days after the second application at the original rates.

Table 1. The evaluation of Primo applied to a Kentucky bluegrass turf.[1]

		Weight[2]				
PGR	Rate oz cf/M	6/03 8 DAT	6/10 15 DAT	6/17 22 DAT	6/24 29 DAT	7/08 43 DAT
Primo 1EC	0.5	7.1bc	2.3ab	2.7b	2.4bc	18.9bc
Primo 1EC	0.75	4.6a	1.7a	1.2ab	1.2a	17.3bc
Primo 1EC	1.0	4.8ab	1.0a	0.7a	0.8a	13.3ab
Primo 25WP	0.4	8.1cd	2.1ab	2.0ab	2.5c	23.1c
Cutless 50WP	1.25 lbs ai/A	10.5de	4.1c	3.0b	1.2ab	6.3a
Scott's TGR 2FL	0.5 lb ai/A	8.4cd	3.4bc	2.6b	1.3a-c	10.2a
untreated		12.1e	9.3d	10.2c	6.8d	19.8bc

continued)

Table 1. The evaluation of Primo applied to a Kentucky bluegrass turf.[1]*(continued)*

		Weight[2]				
PGR	Rate oz cf/M	7/22[ns] 57 DAT	7/29[ns] 64 DAT	8/05* 6 DAT	8/13 14 DAT	9/08[ns] 40 DAT
Primo 1EC	0.5	31.4	11.3	1.1a	2.9a	14.6
Primo 1EC	0.75	33.0	12.9	1.2a	2.4a	10.9
Primo 1EC	1.0	33.6	13.1	0.9a	2.5a	14.3
Primo 25WP	0.4	38.7	13.8	1.3a	3.1a	21.0
Cutless 50WP	1.25 lbs ai/A	24.6	11.0	2.3b	5.3b	12.4
Scott's TGR 2FL	0.5 lb ai/A	32.7	12.5	2.3b	4.9b	21.1
untreated		32.4	10.7	2.8b	10.6c	23.0

[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Weight refers to pounds fresh weight per 1000 sq ft.

[ns] Ns indicates that no significant difference was found among the means in this group of data at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[*] The turf was retreated on July 30, 1993

Table 2. The evaluation of Primo applied to a Kentucky bluegrass turf.[1]

PGR	Rate oz cf/M	Quality[2] 6/07 12 DAT	6/14 19 DAT	6/21 26 DAT	6/28 33 DAT	7/08 43 DAT
Primo 1EC	0.5	7.3cd	6.3b	6.3bc	7.3b	6.0bc
Primo 1EC	0.75	7.0c	5.3a	5.3ab	6.3b	5.3b
Primo 1EC	1.0	5.7a	4.7a	4.7a	4.7a	5.3b
Primo 25WP	0.4	6.3b	5.0a	5.0b	6.7b	6.0bc
Cutless 50WP	1.25 lbs ai/A	8.0e	7.0bc	5.7ab	6.7b	4.3a
Scott's TGR 2FL	0.5 lb ai/A	7.7de	7.7cd	7.0c	6.3b	5.3b
untreated		8.0e	8.0d	7.3c	7.3b	6.3c

(continued)

Table 2. The evaluation of Primo applied to a Kentucky bluegrass turf.[1]*(continued)*

PGR	Rate oz cf/M	Quality[2] 7/15 50 DAT	7/23 58 DAT	7/29 64 DAT	8/05*ns 6 DAT	8/16 17 DAT	9/09ns 41 DAT
Primo 1EC	0.5	7.0b	7.0b	6.7b	6.3	5.3ab	7.3
Primo 1EC	0.75	6.7b	6.7ab	7.0b	7.0	5.3ab	7.0
Primo 1EC	1.0	6.3b	7.0b	6.7b	6.3	5.0a	7.0
Primo 25WP	0.4	7.3b	6.7ab	6.7b	6.3	5.3ab	7.3
Cutless 50WP	1.25 lbs ai/A	5.0a	6.0a	7.0b	6.7	6.0b	7.0
Scott's TGR 2FL	0.5 lb ai/A	6.3b	6.0a	5.3a	6.0	5.7ab	6.7
untreated		6.3b	6.3ab	5.7a	6.0	7.0c	7.0

While any conclusions from this initial study lacks support from multiple environments, it appears that rates of 0.75 oz cf/M or less are useful in reducing the fresh weight production of Kentucky bluegrass turf. Primo 1EC at 0.5 oz cf/M provided the least reduction in quality while showing significant reducation in fresh weight production. This rate of Primo also compared closely to labeled rates of Cutlass 50WP and Scott's TGR. These two materials, however, provided a significant reduction for 43 days after treatment.

This study should be repeated for several more seasons looking at similar and lower rates of Primo 1EC.

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[1] All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

[2] Turf quality is based on a 1-9 scale where 1 = tan turf, bare soil, poor quality and 9 = darkest green, very dense, high quality.

* The turf was retreated on July 30, 1993

ns Ns indicates that no significant difference was found among the means in this group of data at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.

GROWTH RETARDANT RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY

Trimexapac Ethyl Growth Regulation of Kentucky Bluegrass Compared to Competitors

K.L. Diesburg

Research Protocol:	**Growth Regulation of Kentucky bluegrass**
Location:	Southern Illinois University, Carbondale, IL.
Site:	Soil - Hosmer silt clay loam; Cultivar - 'Huntsville.'
Plot Maintenance:	mowing height - 2.25 inches; irrigation - none needed, ample rain; pesticides - preemergent Ronstar and Dacthal in April June; postemergent, Turflon D in March; fertilization - 4 lb N/M/yr.
Experimental Design:	RCB; 3 replications.

One more step forward in turfgrass growth regulation is being achieved with trimexapac ethyl (Primo). The claim being made is that trimexapac ethyl causes a rapid, three-four week inhibition of leaf elongation as is expected with amidochlor (Limit) and mefluidide (Embark). Unlike those two products, however, trimexapac ethyl is an inhibitor of gibberellin synthesis, thereby allowing very slow leaf elongation and growth of other plant organs. Theoretically, this should prevent the reduction of turfgrass quality due to phytotoxicity of the compound or from disease encroachment upon older leaves, as occurs with mefluidide and amidochlor, respectively. Trimexapac ethyl is different from the other gibberellin synthesis inhibitors, flurprimidol (Cutless) and paclobutrazol (TGR), in its rapid effect upon turfgrass growth. The effects of flurprimidol and paclobutrazol are not seen until three to four weeks after treatment.

Timely rains allowed growth of the Kentucky bluegrass to remain vigorous for a longer time than usual going into summer. The only high-stress period was a three-week drought late July and early August, hence the poor experiment turf quality on August 13 and low UTC clipping weight on August 6.

In this experiment, paclobutrazol for long-term and trimexapac ethyl at 0.75 oz/1000 sq ft for short-term had the best combinations of growth inhibition and maintenance of turfgrass quality.

Table 1. Performance of Huntsville Kentucky bluegrass in response to growth regulator applications[1].

		Turf Quality[2]							
	oz/1000	May 7 Trt.			June 12 Trt.				Uniformity[3]
Treatment	sq ft	5/20	6/5	6/12	7/2	7/13	8/3	Avg	8/3
UTC		9.0	8.7	8.4	8.3	7.8	6.8	7.8	4.7
Primo 1EC	0.50 mat.	8.3	8.2	8.0	8.4	7.7	8.0	7.8	6.0
BAS 118	0.04 mat.	9.0	8.8	8.2	8.5	7.3	7.2	7.8	5.0
TGR	0.14 ai.	8.5	8.2	8.5	8.2	8.3	7.8	7.7	5.7
Primo 1EC	0.75 mat.	7.3	7.7	8.0	8.0	7.7	8.2	7.6	6.7
Limit 4F	1.84 mat.	8.3	7.2	7.7	8.6	7.5	6.8	7.4	5.7
Primo 25WP	0.40 mat.	6.8	7.7	8.3	7.8	8.5	7.3	7.3	6.7
Cutless	0.37 ai.	8.0	7.3	8.0	7.7	7.3	7.5	7.2	5.3
Florel 2EC	1.47 ai.	9.0	6.2	8.5	8.3	6.7	7.0	7.1	7.3
Primo 1EC	1.00 mat.	7.0	7.6	7.4	7.7	6.7	7.3	6.9	5.7
Embark / Limit	1.47 mat. / 0.74 mat.	6.3	5.5	7.3	3.5	4.5	4.0	4.9	5.7
Embark 2S	0.14 ai.	5.3	4.2	5.7	2.0	2.0	1.7	3.2	2.7
$LSD_{0.05}$		1.0	2.5	2.3	1.3	1.9	1.6	0.9	2.6

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

[2] Turf quality is based on a 1-9 scale where 1=very poor turfgrass quality and 9=excellent turfgrass quality.

[3] Uniformity based upon a scale of 1 to 9, 9=best. Interruptions in uniformity due mainly to brown patch disease.

Table 2. Clipping Weights (grams) from Huntsville Kentucky bluegrass in response to growth regulator applications, 1993, Southern Illinois University[1].

Treatment	oz/1000 sq ft	May 7 Trt. 5/21	6/7	6/16	June 12 Trt. 7/2	7/15	7/29	8/6	Total
UTC		100.1	61.7	72.4	87.7	71.5	54.8	31.7	480.0
BAS 118	0.04 mat.	71.6	70.2	73.0	76.9	70.4	73.0	35.6	470.8
Limit 4F	1.84 mat.	84.7	38.3	40.3	97.8	78.6	57.0	33.0	429.6
Florel 2EC	1.47 ai.	93.0	29.5	53.1	30.0	60.5	79.3	49.4	394.8
Primo 25WP	0.40 mat.	49.7	39.9	83.4	95.1	49.6	43.7	17.0	378.4
Primo 1EC	0.50 mat.	55.0	38.7	44.4	41.4	66.8	73.6	56.5	376.4
Primo 1EC	0.75 mat.	27.5	26.4	57.5	43.9	45.4	53.1	37.1	290.8
Cutless	0.37 ai.	58.3	22.0	53.0	49.6	38.8	38.7	26.9	287.2
TGR	0.14 ai.	28.6	22.8	51.2	64.3	36.0	22.9	16.9	242.7
Primo 1EC	1.00 mat.	29.6	20.3	52.6	28.9	25.3	38.0	30.9	225.6
Embark / Limit	1.47 mat. / 0.74 mat.	38.5	14.8	46.52	4.7	9.8	14.7	10.5	159.5
Embark 2S	0.14 ai.	30.4	11.3	21.2	3.1	2.8	11.4	7.2	87.4
$LSD_{0.05}$		54.1	19.5	39.0	45.4	24.4	33.4	26.6	106.0

[1]All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

PLANT PATHOLOGY FIELD RESEARCH CONDUCTED AT THE UNIVERSITY OF ILLINOIS

H.T. Wilkinson, R.T. Kane and L.M. Ortiz

Fungicide trials in 1993 included three separate trials conducted at the Urbana, IL Research Center: one for dollar spot, one for both brown patch and dollar spot, and one for summer patch. An extensive study of fungicide control of resistant populations of the fungi which causes dollar spot was conducted at the Ridgemoor Country Club in Chicago, IL. This year the same treatment program used in Chicago was also applied at the Urbana Research Center. Treatments (Tables 1 and 2), results, and interpretation of results are presented only for the brown patch and dollar spot trial in Urbana.

Fortunately, both brown patch and dollar spot disease developed in the Urbana test site. Data for efficacy is reported for both these diseases (Figures 1 and 2). The diseases were evaluated as follows. The data values represent the percentage of area within a plot that is covered by dollar spot symtpoms. The greater the number, the poorer the disease control. Generally, the intensity of the brown patches was less indicative of control than the presence or absence of symptoms. The reason for this was the rapid rate of grass growth and recovery from disease. If a chemical fungicide controls brown patch, then the grass growth will rapidly (less than a week) mask the symptoms. We do not consider it adequate control, if the symptoms of brown patch were weak, but still visible. Any treatment giving a 0.67 or less rating for disease severity was controlling brown patch. In our opinion, however, only a rating of less than 0.3 after the second or third application was an acceptable level of control.

This year no trials included urea. In past years, we have found that mixing urea with fungicides has been very effective in reducing the amount of required fungicide while improving the control of dollar spot and increasing turf quality. This tank mix concept was expanded to the control of brown patch, but there was no clear indication that the addition of urea enhanced the control of brown patch. Do to a lack of interest, this program was discontinued in 1993.

There were no surprises with the control of dollar spot at the Urbana location. Very interestingly, preliminary work in the Chicago area indicated evidence of resistance by these fungi. These fungi have shown resistance to fungicides in the past, but the resistance we observed was being expressed against a different class of chemicals.

The summer patch disease pressure on the Urbana farm was too low to evaluate fungicides during 1993. These tests and others will be conducted again in 1994.

A study on the dynamics of four different nematode genera in bentgrass putting greens in Urbana and Chicago was competed in 1992. The data will be published in the Journal of Nematology in 1994. An abstract was presented at the national meeting of the American Phytopathological Society, and an article in Golf Course Management has been published. In addition, an oral report was given at the Greens Seminar in Chicago held during March, 1992.

Results from the study located in Chicago on resistant dollar spot provided some

interesting and useful data. First, that fungal population appeared to effectively cause dollar spot in the presence of several fungicides that previously gave excellent control. The loss of control was first apparent as a decrease in the timing interval between chemical applications required to maintain adequate control of the disease. This was followed by complete failure of the chemical. Secondly, the general use of urea-nitrogen (2 lbs/M) did enhance the quality of the turf. Alternating chemicals also can produce better control. These tests may be repeated in 1994 at both the Chicago and Urbana sites.

Fungicide Trial For The Control of Dollar Spot on Bentgrass

H.T. Wilkinson, R.T. Kane and L.M. Ortiz

Research Protocol:	**Bentgrass Dollar Spot Fungicide Trial**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	pathogen inoculation - natural inoculum, not artificial inoculum was applied; fertilized - 2.5 kg N/M/yr; pesticides - applied as need.
Plot Maintenace:	mowing height - 0.63 cm every other day; irrigation - natural rainfall plus 2.5 cm/week if needed; topdressing - bimonthly; 80:20 sand/soil mixture.
1993	Initial fungicide treatments applied on Julian day 211 (July 30, 1993); additional applications applied at a 14 or 28 day interval; applied in 18 L water/M; plot size - 1.0 m x 1.0 m.
Experimental Design:	CRD; 3 replications.

Dollar spot continues to develop on creeping bentgrass, bluegrass, ryegrass and several other minor grasses. During the 1993 growing season, this disease was severe. In addition, resistance to the fungicides by the fungal pathogens that cause this disease is a continuing threat. Testing the efficacy of new chemical fungicides and continuing to evaluate registered fungicides was the focus of the 1993 research program (Table 1). Plots were evaluated six times throughout the growing season (Figures 1a-1c). Tests for control of dollar spot were conducted on creepingbentgrass at Urbana and Chicago sites.

Table 1. Dollar spot fungicide trial: 1993 Urbana, IL.

Treatment Number	Manufacturer	Fungicide	Rate (fl oz/M)	Spray Interval (in days)
1	Rohm & Haas	Eagle	0.6	14
2	Rohm & Haas	RH7592	0.5	14
3	ISK	Fluazinam 500	0.8	14
4	ISK	Fluazinam 500	2.0	28
5	ISK	Daconil	6.0	14
6	ISK	Daconil SDG	3.8	14
7	ISK	ASC 67098 X 3:1	5.0	21
8	ISK	ASC 67098 Z 5:1	6.0	21
9	Dow Elanco	Rubigan AS	0.8	14
10	Dow Elanco	Rubigan AS	1.0	14
11	Dow Elanco	Fore	3.0	14
12	Dow Elanco	Fore	4.0	14
13	Dow Elanco	Curalan	0.8	14
14	Dow Elanco	Curalan	1.00	14
15	Dow Elanco	Twosome	3.0	14
...24*		Untreated check	-	

*Treatments 16 through 23 are not presented.

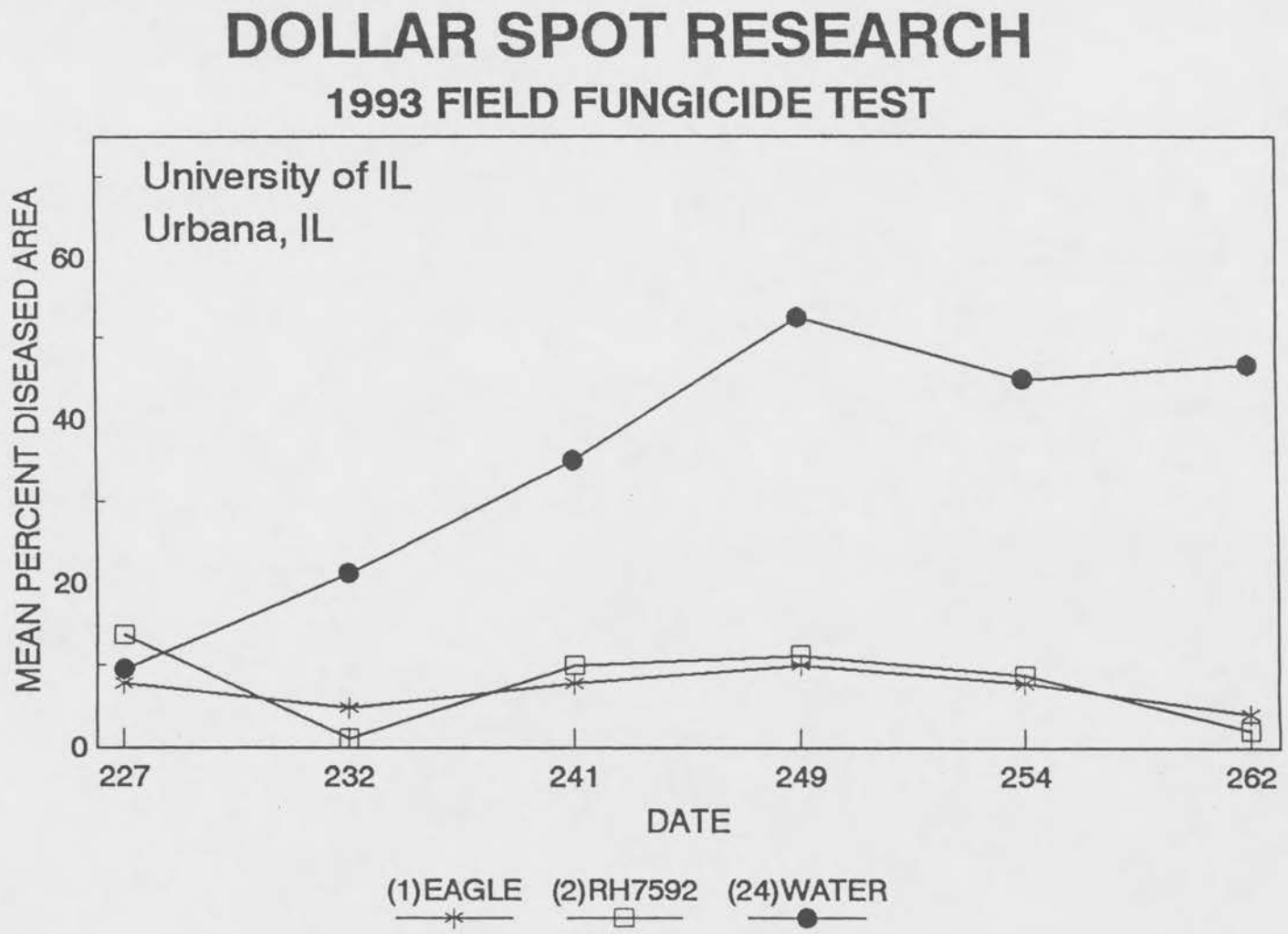

Figure 1a. Control of dollar spot on bentgrass.

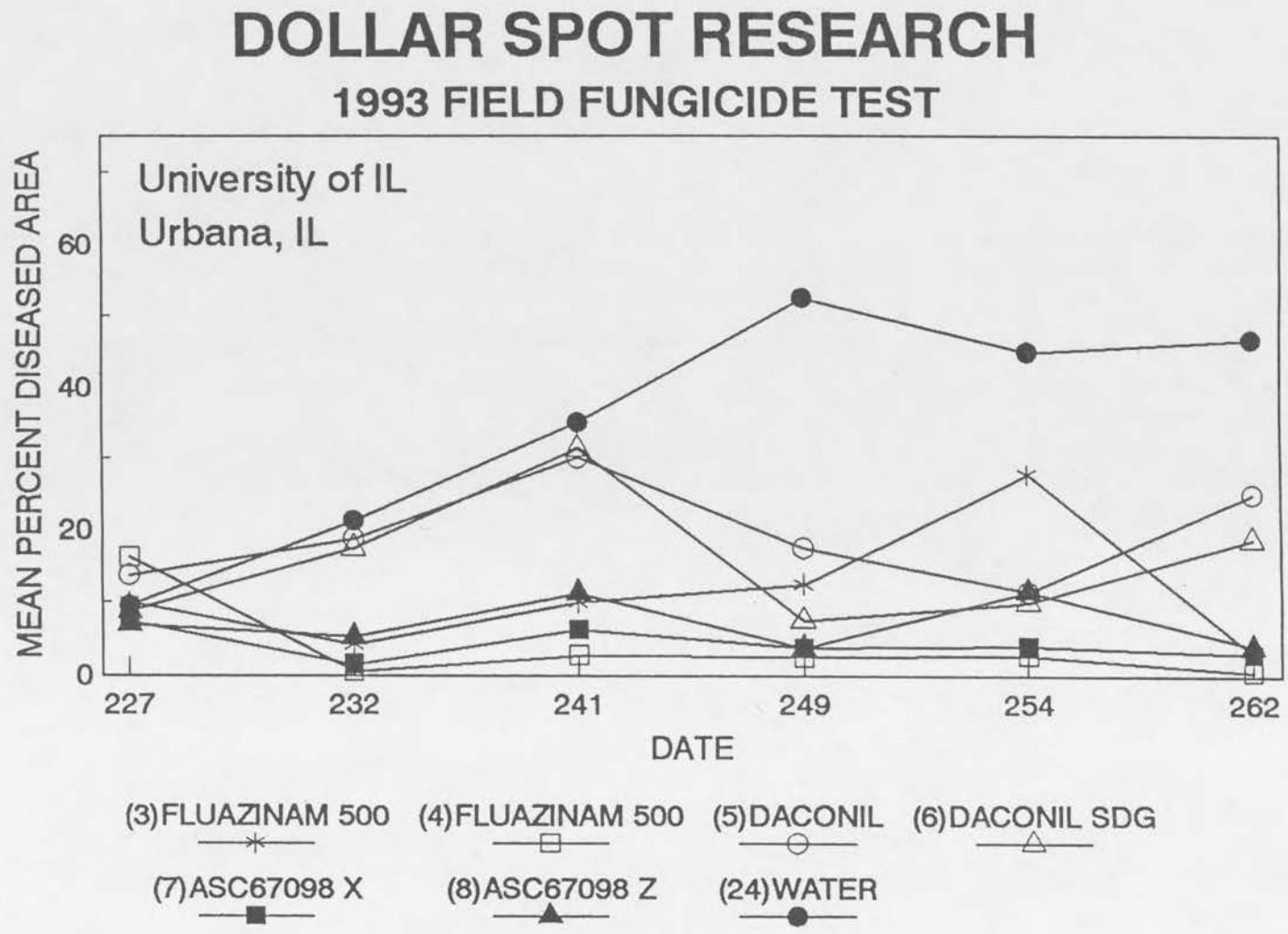

Figure 1b. Control of brown patch on bentgrass.

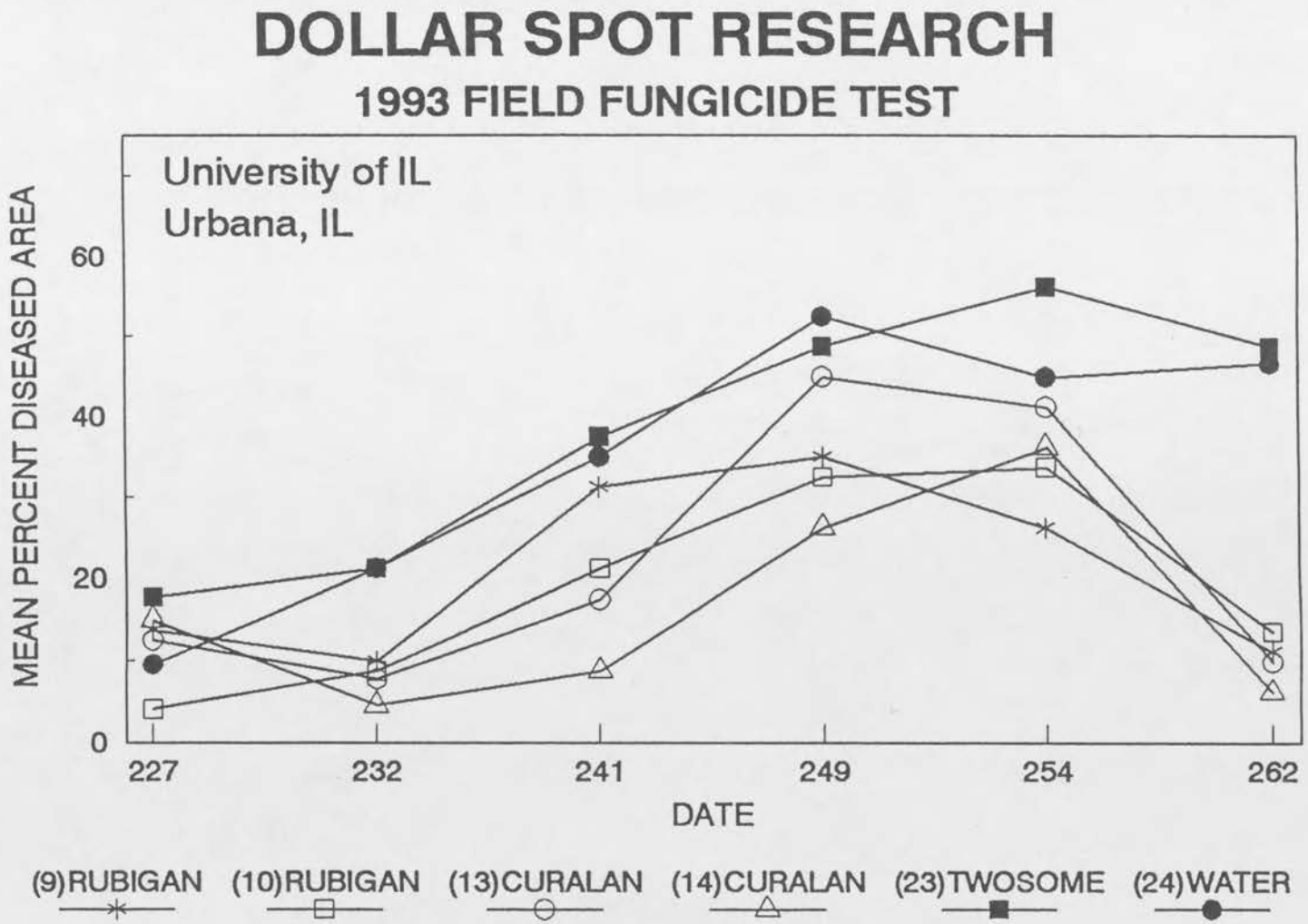

Figure 1c. Control of brown patch on bentgrass.

Fungicide Control of Brown Patch on Bentgrass

H.T. Wilkinson, R.T. Kane and L.M. Ortiz

Research Protocol:	**Bentgrass Brown Patch Fungicide Trial**
Location:	Ornamental Horticulture Research Center, Urbana, IL.
Site Preparation:	pathogen inoculation - natural inoculum and artificial inoculum applied twice at 3 kg/M; fertilized - 2.5 kg N/M/yr; pesticides - applied as need.
Plot Maintenace:	mowing height- 0.63 cm every other day; irrigation - natural rainfall plus 2.5 cm/weekif needed, after inoculation, 0.5 cm of water was applied every 6 hrs for a period of 1 week; topdressing - bimonthly; 80:20 sand/soil mixture.
1993	Initial fungicide treatments - applied on Julian day 211 (July 30, 1993); additional applications applied at a 14 or 28 day interval; applied in 18 L water/M; plot size- 1.0 m x 1.0 m.
Experimental Design:	CRD; 3 replications.

The brown patch disease remains a problem on bentgrass golf greens in the Mid-west, because it develops each year and there are no exceptional control programs for it. This season, 24 different treatments were applied to diseased bentgrass and evaluated for their ability to control brown patch (Table 2). In years past, we relied on natural inoculum for disease pressure in the research greens, but this proved to be too erratic. This season we used a combination of natural and artificial inoculum of the pathogen to insure adequate disease pressure. We feel that the results were better. We will continue to use this method next year to insure good pathogen pressure and reliable test results. It should be pointed out that the pathogen used to inoculate the grass was the same as the natural one. Plots were evaluated five times throughout the growing season (Figures 2a-2c).

Table 2. Brown patch fungicide trial: 1993 Urbana, IL.

Treatment Number	Manufacturer.	Fungicide	Rate fl oz/M	Spray Interval (in days)
1	Rohm & Haas	Eagle	0.6	14
2	Rohm & Haas	RH7592	0.5	14
3	ISK	Fluazinam 500	0.8	14
4	ISK	Fluazinam 500	2.0	28
5	ISK	Daconil	6.0	14
6	ISK	Daconil SDG	3.8	14
7	ISK	ASC 67098 X 3:1	5.0	21
8	ISK	ASC 67098 Z 5:1	6.0	21
9	Dow Elanco	Rubigan AS	0.8	14
10	Dow Elanco	Rubigan AS	1.0	14
11	Dow Elanco	Fore	3.0	14
12	Dow Elanco	Fore	4.0	14
13	Dow Elanco	Curalan	0.8	14
14	Dow Elanco	Curalan	1.00	14
15	Dow Elanco	Twosome	3.0	14
...24*		Untreated check	-	

*Treatments 16 through 23 are not presented.

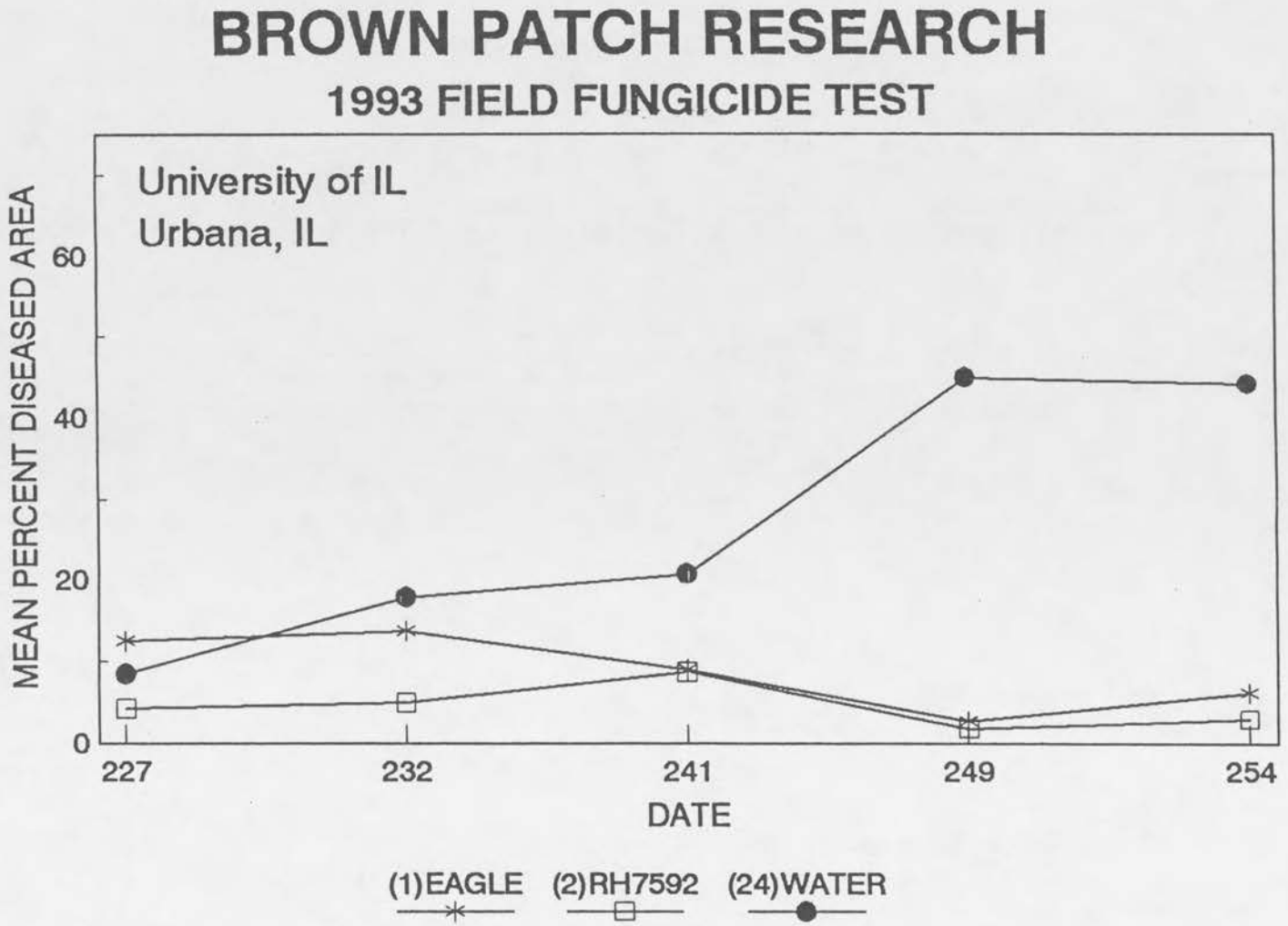

Figure 2a. Control of brown patch on bentgrass.

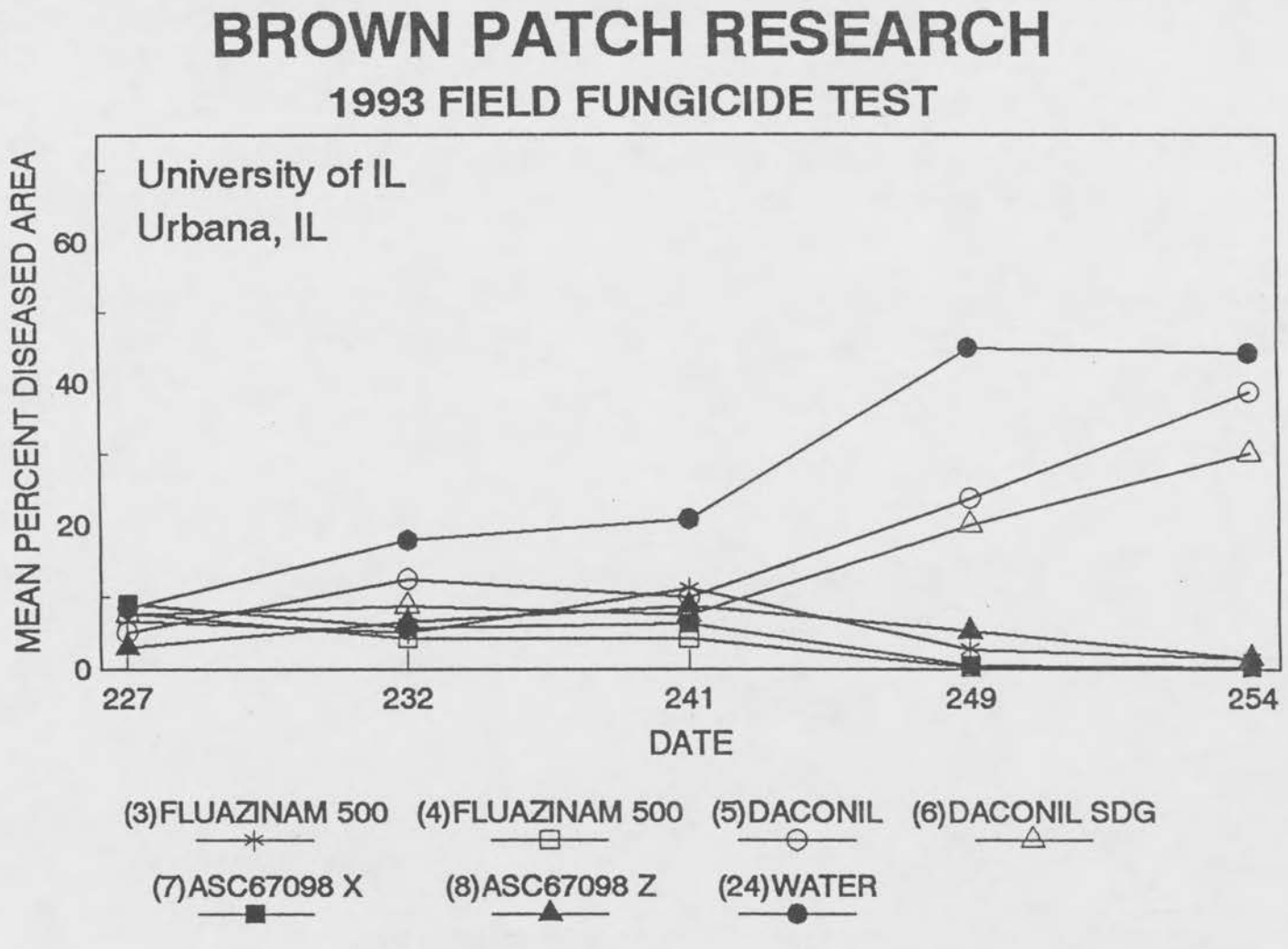

Figure 2b. Control of brown patch on bentgrass.

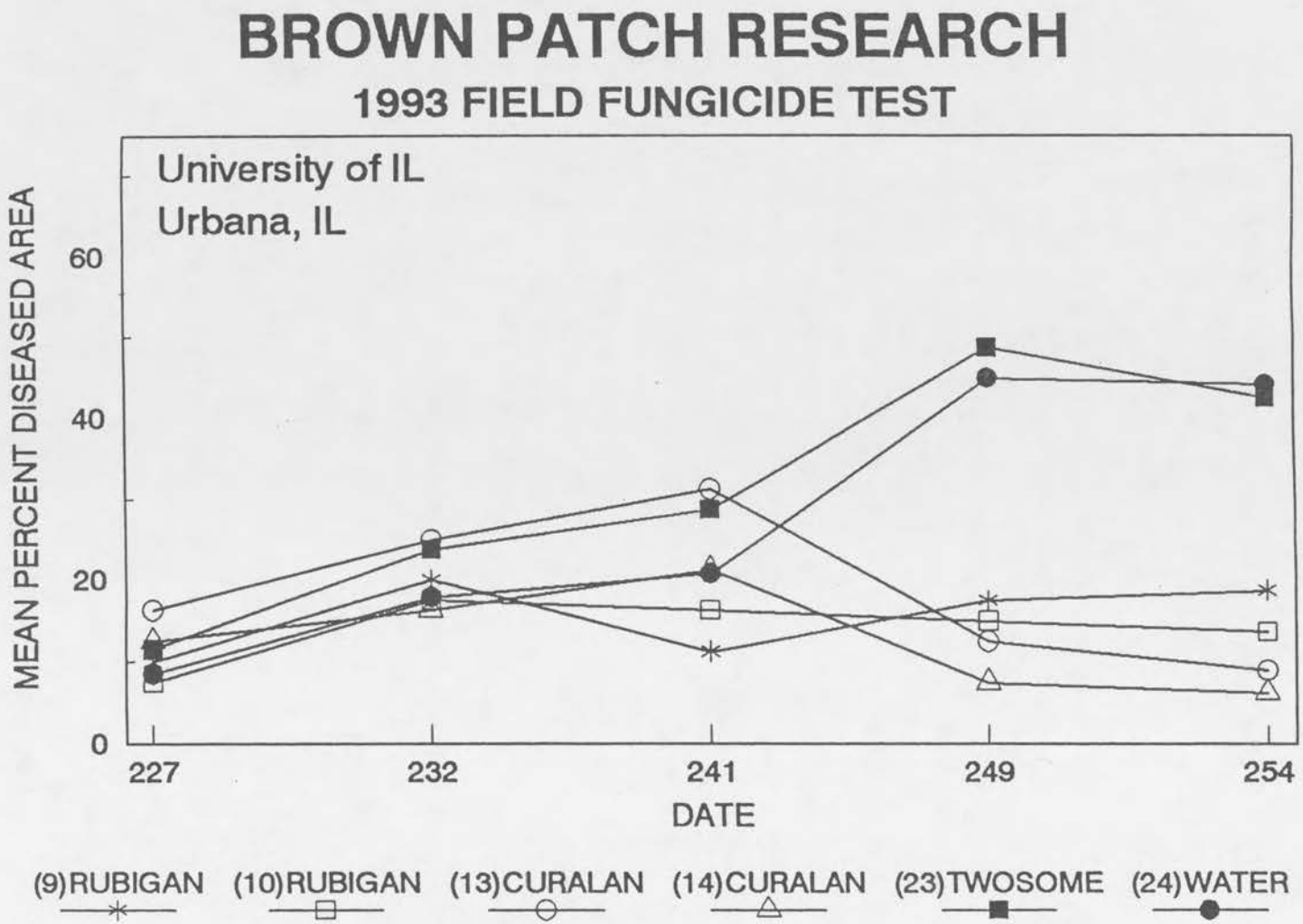

Figure 2c. Control of brown patch on bentgrass.

Update: Program for the Fungicidal Control of Summer Patch of Bluegrass

H.T. Wilkinson

As a result of my extensive research on summer patch, I offer the following update which addresses predicting summer patch development in bluegrass. There are two research programs underway from which I base my comments. Firstly, part of my annual field research program will determine at what natural soil temperature the summer patch fungus (*Magnaporthe poae*) colonizes and causes disease on bluegrass that is not moisture stressed. This research was not part of the special research project that five agrichemical companies, agreed to take part in. My field program only investigates increasing soil temperature during the spring of the year. To date, no other conclusive research has been conducted on the development of this fungus on grass roots during the spring of the year.

Secondly, a special research project was developed to answer several questions regarding the best application site for fungicidal suppression of *M. poae*. The intent of this laboratory study was to carefully determine if five different commercial fungicides could: i) suppress the fungus when applied to the foliage after the fungus had colonized the roots; ii) suppress the fungus when applied to the soil after the fungus had colonized the roots; iii) suppress the fungus either before or after colonization of the roots when applied directly to the roots. At this time, research on i, ii, and iii is partially completed. The preliminary results showed that if the fungus was allowed to colonize the roots, none of the foliar or soil applied fungicides effectively suppressed the fungus. The third study requires more time.

Collectively the results from the field and the laboratory studies have allowed me to develop some recommendations for the use of certain fungicides for the suppression of summer patch of bluegrass. The recommendations, or model if you would, could be listed as follows:

1. The fungus starts colonizing roots at about 68 +/- 3°F if there is sufficient moisture.
   Recommendation: Fungicides should be applied at that time in the spring when the soil temperature is 68 +/- 3°F.
2. The soil temperature measured was the mean daily average which generally occurred at about 10-11 a.m.
   Recommendation: Measure the soil temperature at about 10-11 a.m. or at that time when the soil temperature approximates the daily average temperature.
3. Most of the roots of bluegrass and annual bluegrass that become infected are in the upper 5 cm of the soil profile, not including the thatch layer if one exists.
   Recommendation: Measure the soil temperature at a depth of about 5 cm under the sod.
4. Preliminary data indicated that a single application of fungicide applied as

described above will be sufficient and that repeated applications during the summer especially after symptoms have developed are of little value in suppressing the disease.

Recommendation: For the Mid-West, a single application of fungicide in the Spring, applied at the high recommended rate should produce the best results. Use of this product may vary as the distance from central Illinois isincreased.

5. Only in controlled field experiments did fungicides have a high level of suppression. This was not the case in naturally infested turf. Empirical studies have shown that the suppression of summer patch will generally require several years of an intensive chemical and cultural program.

   Recommendation: Do not encourage consumers that a single application of a fungicide is a stand-alone cure for summer patch. It is one component of an integrated program.

6. No research has been done to determine if the fungus is active in the soil during the fall of year. While no research has been done in the field, two facts have come from laboratory studies. The fungus requires a soil temperature of at least 68°F yet will still grow on roots at a temperature of 86°F. The fungus colonizes living, growing roots not dead or quiescent roots.

   Recommendation: If a sod is displaying the symptoms of summer patch during the months of July-September, then the spring control program was not effective enough and a treatment during the following spring should be encouraged. In addition, an experimental application of fungicide in the fall should be considered. The fall application should be timed when the grass roots are growing. This will vary greatly from turf to turf and depend on climate, soil, management and so on. Generally, if the roots are going to grow in the fall it will probably be at a soil temperature cooler than 80°F. The temperature will be more likely between 65-75°F when sufficient water is present. Growing roots will be white and flexible.

7. Empirical studies have shown that a wet turf and wet soil under turf are most conducive to realizing disease suppression from the application of fungicides for the control of summer patch.

   Recommendation: The turf should be moistened to a depth of at least 5 cm and more if possible. The fungicide should be applied in at least 5 gal water per 93 m^2. An additional 1.5 cm of water should be applied after fungicide is applied.

These comments represent my preliminary research on summer patch. More needs to be done and research is slow and costly. I hope that these comments are useful and will encourage you and your company to continue to support my research. Thank you for your interest in the University of Illinois Turfgrass Pathology Research Program.

FUNGICIDE RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY

Comparison of Fungicides in Control of Brown Patch in Tall Fescue

K.L. Diesburg

Research Protocol:	**Comparison of Fungicides in Control of Brown Patch in Tall Fescue**
Location:	Southern Illinois University, Carbondale, IL.
Site:	soil - Hosmer silt clay loam; cultivar - Arid.
Plot Maintenance:	mowing height - 2.25 inches; irrigation - not needed, ample rainfall; pesticides - Ronstar in April, Dacthal in June, Turflon D in April and November; fertilization - 4 lbs N/M/yr (SCU, UF, formolene).
Fungicide Application Dates:	June 18, July 1, 15, 30.
Experimental Design:	RCB; 4 replications.

This is the second year in a row we have been able to keep *Rhizoctonia solani* continuously virulent in tall fescue from May to August. During 1992, irrigation was needed, but not this year. Consistent disease pressure in the field over a period of time is ideal for screening efficacy of fungicides as well as for screening germplasm. *(Tables are on the following page.)*

Table 1. Comparison of fungicide efficacy on brown patch in tall fescue.[1]

Treatment	Rate oz cf/M	Percent Disease Incidence 7/06	7/28	9/14	Average
UTC 1		68	52	33	51
UTC 2		61	54	8	41
UTC 3		46	44	25	38
Exp 10307A + Exp 02164B	1.0 + 0.9	8	15	46	23
Exp 67098Z	6.0	3	12	44	20
Exp 10064C	1.0	19	31	9	19
Daconil 2787	6.0	18	5	27	17
Exp 01945B	9.1	16	9	25	17
Exp 67098X	4.0	2	10	34	15
Exp 10307A	1.5	13	24	6	14
Exp 10307A	1.5	12	15	12	13
Exp 02164B	1.2	4	13	20	12
Exp 10452A	2.0	16	12	6	11
Exp 01945B	4.5	9	9	15	11
Exp 10452A	1.0	12	8	9	10
Exp 10307A	2.0	8	9	14	10
Chipco 26019	2.0	10	5	4	7
Fluazinam + Fore	1.0 + 4.0	2	2	7	4
Aliette + Fore	2.0 + 4.0	1	3	5	3
Aliette + Fore	4.0 + 8.0	2	1	8	3
$LSD_{0.05}$		13	20	26	8

[1] All values represent the mean of three replications. Means within a column that result in a difference less than the LSD given at the bottom of that column when subtracted from any other mean within the column are not different from that mean.

APPENDIX A
ABBREVIATIONS

A	Acre.
ai	Active ingredients.
cf	Commercial formulation or formulated product.
cm	Centimeters.
CRD	Completely randomized design.
cv	Cultivar.
DAT	Days after treatment.
ft	Feet.
gpa	Gallons per acre.
K	Potassium.
lbs ai/A	Pounds of active ingredient per acre.
lbs cf/A	Pounds of formulated product per acre.
LSD	Least significant difference.
M	1000 square feet.
N	Nitrogen.
ns	Not significant.
NTEP	National Turfgrass Evaluation Program.
oz	Ounce(s).
P	Phosphorous.
pgr(s)	Plant growth retardant(s).
pt	Pint(s).
RCB	Randomized complete block.
RCU	Resin coated urea.
SCU	Sulfur coated urea.
UF	Urea formaldehyde.
WAT	Weeks after treatment.
yr	Year.

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_____	RPD 403	Fairy Rings, Mushrooms, and Puffballs (9/87)	_____
_____	RPD 404	Snow Molds (6/87)	_____
_____	RPD 405	Helminthosporium Leaf, Crown, and Root Diseases of Lawn Grasses (4/86)	_____
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APPENDIX C
WEATHER INFORMATION FOR CHAMPAIGN, IL

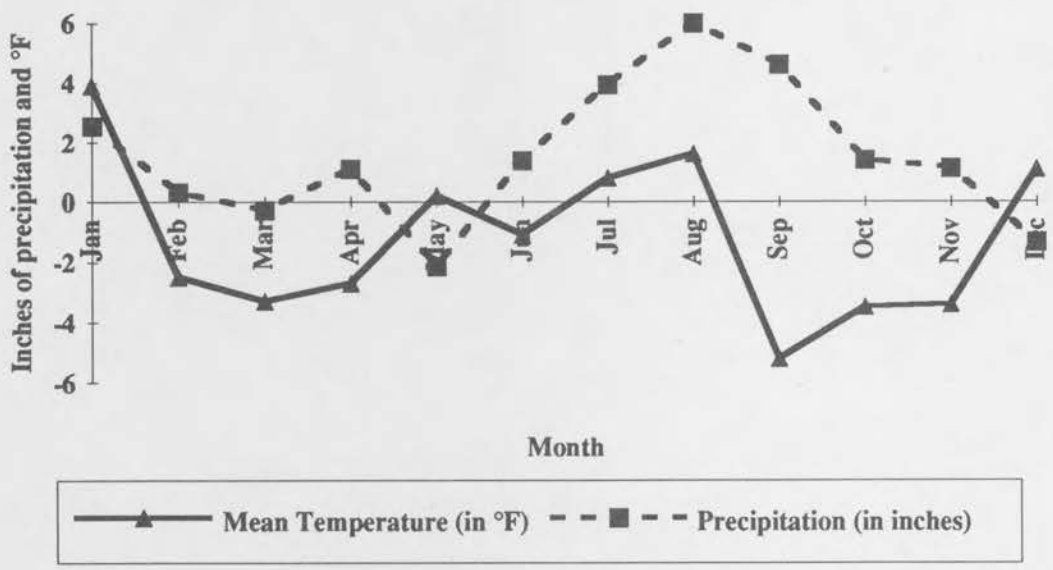
1993 Champaign-Urbana Weather

T.B. Voigt

Weather conditions in Champaign-Urbana during 1993 were cooler and wetter than normal. Mean monthly temperatures were above average during January, May, July August, and December, but were below average during the growing months of April, June, September, and October (Figure 1). There were only 11 days during the year when temperatures rose above 90°F (2 days in June, 4 days in July, and 5 days in August) which is 9 less than normal. There were 5 days when temperatures dropped below 0°F (4 days in February and 1 day in December) which is 3 less than normal. Overall, for 1993, mean temperature was 1.1 °F below normal and there were fewer extreme temperature events than normal.

The trend of above normal precipitation continued in 1993. In 1992, the total precipitation was 5.01 inches greater than normal. Precipitation in 1993 was 18.8 inches greater than normal (Figure 1). Monthly precipitation was below normal in only March, May, and December. August precipitation was above 6 inches above average, setting a record for the wettest August on file.

Figure 1. 1993 temperature and precipitation deviations from average



Central Illinois Turf Problems in 1993. During 1993, several general turf disease problems were reported. First, several complaints of diseases often associated with inadequate nitrogen conditions such as dollar spot, red thread, and rust were received. These diseases were probably enhanced by the abundant summer moisture. Second, some leaf spot problems were reported during the early growing season on cool season grasses. In a few cases, there were reports of melting out following the leaf spot. Finally, several reports of *Pythium* blight were received from central Illinois golf courses in August where perennial ryegrasses are used in fairways. During this month, both temperature and precipitation were above normal.

Several reports of general turf stress were received during the later portion of the summer in areas were surface and internal drainage was inadequate and soils were heavy. Constantly wet, heavy soils probably led to reduced turf root systems and a overall lack of turf stress tolerance.

Moss seemed to be a greater concern than normal in 1993. Moist soil conditions caused by the abundant precipitation enhanced moss development in many shady areas.

The number of grub damage complaints, in general, were fewer than normal in 1993. Adequate moisture during egg laying probably distributed the female beetles over a wide range, which reduced the number of sites where grub populations were heavily concentrated. The moist conditions in late summer also helped any affected turf recover from grub invasion.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				January 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
01/01/93	19	8	14	T	T	0	SW-	NW	4.7	CLDY	51	0
01/02/93	34	15	25	.06	0	0	R,L,ZR., ZL,IP	SE	8.8	CLDY	40	0
01/03/93	53	34	44	1.02	0	0	R,L,F	S	12.9	CLDY	21	0
01/04/93	56	27	42	1.37	T	0	R,L,SW-	S	13.6	CLDY	23	0
01/05/93	27	25	26	T	T	T	SW-	WNW	4.5	PC	39	0
01/06/93	31	21	26	0	0	0		S	3.2	CLDY	39	0
01/07/93	29	20	25	.02	.2	0	SW-			CLDY	40	0
01/08/93	29	24	27	0	0	T		NE	10.3	CLDY	38	0
01/09/93	28	24	26	.36	4.5	T	SW,BS	NE	12.7	CLDY	39	0
01/10/93	24	20	22	.14	1.8	6	SW,BS	NE	10.0	CLDY	43	0
01/11/93	27	20	24	0	0	5		NE	5.9	CLDY	41	0
01/12/93	35	27	31	.17	0	5	F,ZL,ZR, R,L	E	4.5	CLDY	34	0
01/13/93	34	19	27	.02	T	4	R,SW-	W	15.7	CLDY	38	0
01/14/93	24	16	20	T	0	T	SW-	W	6.7	CLDY	45	0
01/15/93	24	18	21	T	T	4	SW-	W	3.4	CLDY	44	0
01/16/93	33	22	28	.02	.2	4	SW-	S	6.7	CLDY	37	0
01/17/93	33	11	22	0	0	3		NW	8.3	CLR	43	0
01/18/93	24	8	16	0	0	3		NE	5.9	CLDY	49	0
01/19/93	28	9	19	0	0	3		NE	5.7	CLR	46	0
01/20/93	37	19	28	.90	0	3	R,L	SE	6.0	PC	37	0
01/21/93	38	32	35	.31	0	2	R,RW,F	W	7.0	CLDY	30	0
01/22/93	40	30	35	T	T	T	SW-	W	9.3	PC	30	0
01/23/93	53	29	41	0	0	T		S	10.7	PC	24	0
01/24/93	35	24	30	T	T	0	SW-	NW	10.0	CLR	35	0
01/25/93	32	20	26	0	0	0		NW	2.7	CLR	39	0
01/26/93	41	21	31	0	0	0				CLR	34	0
01/27/93	40	29	35	0	0	0		NW	5.1	PC	30	0
01/28/93	47	20	34	0	0	0		WNW	11.0	PC	31	0
01/29/93	27	13	20	0	0	0		NW	7.8	CLR	45	0
01/30/93	39	15	27	0	0	0		W	12,0	CLR	38	0
01/31/93	51	30	41	0	0	0		W	14.3	PC	24	0
Total/ Average[5]	34.6	21.0	27.8	4.39	6.7			W	8.3		1,147	0
Departure from Average	+2.9	+5.0	+3.9	+2.56	-1.4			W	+0.0		-136	+0

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				February 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
02/01/93	37	24	31	0	0	0		NE	9.3	CLR	34	0
02/02/93	40	17	29	0	0	0		SE	2.9	PC	36	0
02/03/93	50	23	37	0	0	0		SE	2.8	PC	28	0
02/04/93	52	29	41	0	0	0		NE	3.3	CLR	24	0
02/05/93	52	25	39	0	0	0	F	NW	3.7	CLR	26	0
02/06/93	38	31	35	0	0	0	F	NE	5.0	CLDY	30	0
02/07/93	53	31	42	0	0	0		SW	7.8	PC	23	0
02/08/93	37	31	34	0	0	0	F	NE	6.4	CLDY	31	0
02/09/93	49	32	41	0	0	0		SE	4.9	CLDY	24	0
02/10/93	63	30	47	0	0	0	F	SSE	4.4	CLDY	18	0
02/11/93	38	32	35	0.64	0	0	R,F	NE	10.9	CLDY	30	0
02/12/93	32	29	31	0.22	0.4	0	R,ZR,SW-F			CLDY	34	0
02/13/93	31	27	29	T	T	T	SW-			CLDY	36	0
02/14/93	27	20	24	0	0	T		W	3.0	CLDY	41	0
02/15/93	28	20	24	0.28	3.1	0	S			CLDY	41	0
02/16/93	29	16	23	0.17	1.9	5	S,SW-,BS	NW	11.2	CLDY	42	0
02/17/93	17	-2	8	T	T	4	SW-	W	9.7	CLR	57	0
02/18/93	11	-9	1	0	0	4		W	8.8	CLR	64	0
02/19/93	26	5	16	0	0	4		S	8.6	PC	49	0
02/20/93	32	21	27	0.22	2.2	3	SW, R	SE	5.6	CLDY	38	0
02/21/93	37	28	33	0.15	0	3	R,L,F	W	9.6	CLDY	32	0
02/22/93	28	16	22	0.01	0.1	3	SW-,BS	W	14.5	CLDY	43	0
02/23/93	16	4	10	0	0	3		W	11.5	CLR	55	0
02/24/93	15	-1	7	0	0	3		NW	5.1	CLR	58	0
02/25/93	19	9	14	0.61	10.2	3	SW,BS	E	6.9	CLDY	51	0
02/26/93	27	11	19	T	T	13	SW-	N	9.7	PC	46	0
02/27/93	28	4	16	0	0	12	F	N	2.5	CLR	49	0
02/28/93	31	-3	14	0	0	11		S	5.6	CLR	51	0
02/29/93												
Total/ Average[5]	33.7	17.9	25.8	2.30	17.9			W	6.2		1,091	0
Departure from Average	-2.6	-2.4	-2.5	+0.33	+10.9			S	-1.8		+49	0

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				March 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
03/01/93	41	20	31	0	0	10		SW	6.8	CLR	34	0
03/02/93	40	30	35	0.35	0	7	L,R,R-	E	3.3	CLDY	30	0
03/03/93	38	35	37	0.10	0	5	L,R,F	NE	7.2	CLDY	28	0
03/04/93	36	32	34	0.63	1.6	4	L,R,ZR,SW,F	N	12.3	CLDY	31	0
03/05/93	39	28	34	0	0	4		NW	8.1	PC	31	0
03/06/93	47	25	36	0	0	1		W	5.4	CLR	29	0
03/07/93	40	30	35	T	0	T	L,F	W	8.2	CLDY	30	0
03/08/93	41	32	37	T	0	T	L	W	9.7	CLDY	28	0
03/09/93	43	27	35	0	0	0		SE	4.3	PC	30	0
03/10/93	39	32	36	0.06	0.2	0	R-L,SW,ZRIP	NW	10.9	PC	29	0
03/11/93	32	24	28	0	0	T	SW-	NW	7.3	CLDY	37	0
03/12/93	33	22	28	T	T	T	SW-	NNW	5.3	PC	37	0
03/13/93	26	13	20	0.01	0.1	T	SW	N	13.4	CLDY	45	0
03/14/93	24	10	17	0	0	0		NW	6.5	CLR	48	0
03/15/93	51	12	32	0	0	0		S	16.4	CLDY	33	0
03/16/93	42	34	38	0.25	T	0	R,L,SW-IP-	S	16.5	CLDY	27	0
03/17/93	34	18	26	0	0	0		N	11.5	CLR	39	0
03/18/93	36	15	26	0	0	0		E	5.6	PC	39	0
03/19/93	34	25	30	0.42	0.7	T	SW,R,L,IP	SE	7.0	CLDY	35	0
03/20/93	40	34	37	0.05	T	0	R-,L,SW-F	WNW	4.1	CLDY	28	0
03/21/93	41	33	37	0.06	0	0	R-,L	W	3.3	CLDY	28	0
03/22/93	52	36	44	0.72	0	0	R,L	E	5.8	CLDY	21	0
03/23/93	51	36	44	0.05	0	0	R,L	W	8.6	CLDY	21	0
03/24/93	44	34	39	T	0	0	L	NE	3.7	CLDY	26	0
03/25/93	47	40	44	0	0	0	F	NE	8.2	CLDY	21	0
03/26/93	58	38	48	0	0	0	F	NE	11.2	PC	17	0
03/27/93	58	34	46	0	0	0	F	N	9.5	PC	19	0
03/28/93	60	33	47	0	0	0		N	6.0	CLR	18	0
03/29/93	67	37	52	0	0	0		N	4.2	CLR	13	0
03/30/93	74	43	59	0	0	0		SE	5.4	PC	6	0
03/31/93	58	42	50	0.34	0	0	R,L	SE	7.4	CLDY	15	0
Total/ Average[5]	44.1	29.2	36.7	3.04	2.6			NE	7.8		873	0
Departure from Average	-4.7	-1.9	-3.3	-0.26	-1.5			S	-0.8		+88	-1

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				April 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
04/01/93	42	26	34	0.13	1.1	0	R-L,IP,SW-SG,ZR	N	11.9	CLDY	31	0
04/02/93	39	26	33	0	0	T		NW	7.6	CLDY	32	0
04/03/93	46	24	35	0	0	0		NW	3.1	PC	30	0
04/04/93	49	30	40	0	0	0		NE	6.1	CLDY	25	0
04/05/93	45	33	39	T	0	0	L	NE	6.7	CLDY	26	0
04/06/93	58	34	46	0	0	0	F	NE	4.7	PC	19	0
04/07/93	66	42	54	0.02	0	0	R-,L	SE	9.5	CLDY	11	0
04/08/93	59	52	56	0.35	0	0	R,L,F	S	12.4	CLDY	9	0
04/09/93	57	46	52	0.01	0	0	L	N	8.6	CLDY	13	0
04/10/93	65	35	50	0	0	0	F	SE	5.5	PC	15	0
04/11/93	60	43	52	0	0	0		W	13.0	PC	13	0
04/12/93	51	38	45	0.03	0	0	R-,L	NE	8.1	CLDY	20	0
04/13/93	58	41	50	1.19	0	0	TRW+,TRW,R	E	5.9	CLDY	15	0
04/14/93	58	46	52	0.62	0	0	TRW,R,L	SE	7.1	CLDY	13	0
04/15/93	62	39	51	0.38	0	0	R,L,RW,TRW-	SW	12.9	CLDY	14	0
04/16/93	42	34	38	0.02	T	0	RW-,L,SW-	SW	11.9	CLDY	27	0
04/17/93	60	30	45	0	0	0		W	6.1	CLR	20	0
04/18/93	63	40	52	0	0	0		SW	9.6	PC	13	0
04/19/93	63	48	56	0.61	0	0	TRW,R,L	S	14.5	CLDY	9	0
04/20/93	59	36	48	0.04	0	0	RW-,L	N	12.2	CLDY	17	0
04/21/93	53	34	44	0	0	0		N	9.0	PC	21	0
04/22/93	60	32	46	0	0	0		W	5.6	CLR	19	0
04/23/93	69	45	57	0	0	0		SE	9.7	CLDY	8	0
04/24/93	72	56	64	0.80	0	0	TRW+,R	S	18.8	CLDY	1	0
04/25/93	60	49	55	0.61	0	0	TRW+,R	N	8.0	PC	10	0
04/26/93	61	41	51	0	0	0		NE	7.0	CLR	14	0
04/27/93	68	40	54	0	0	0		SSE	8.5	CLR	11	0
04/28/93	74	53	64	T	0	0	L	S	7.2	CLDY	1	0
04/29/93	62	52	57	0.24	0	0	R,RW-L,F	SW	7.0	CLDY	8	0
04/30/93	73	48	61	0.01	0	0	L,F	E	3.2	CLR	4	0
Total/ Average[5]	58.5	39.8	49.2	5.06	1.1			SE	8.7		469	0
Departure from Average	-3.9	-1.6	-2.7	+1.12	+0.1			S	+0.2		+58	-10

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				May 1993 Summary				
	Temperature			Prec ip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
05/01/93	73	56	65	0.04	0	0	RW-,L	SE	7.2	PC	0	0
05/02/93	72	58	65	0.11	0	0	RW,RW-,L	SE	8.9	CLDY	0	0
05/03/93	64	57	61	0.10	0	0	R,L,F	SE	9.9	CLDY	4	0
05/04/93	67	56	62	0.17	0	0	RW,L,F	S	8.4	CLDY	3	0
05/05/93	77	55	66	0	0	0	F	W	4.1	PC	0	1
05/06/93	78	54	66	0	0	0		SE	3.2	CLR	0	1
05/07/93	78	60	69	0	0	0		SE	7.3	CLDY	0	4
05/08/93	85	59	72	0	0	0		SE	7.7	PC	0	7
05/09/93	85	64	75	0	0	0		S	8.6	CLR	0	10
05/10/93	85	62	84	0	0	0		SE	7.2	PC	0	9
05/11/93	85	61	73	0	0	0	F	SE	4.0	PC	0	8
05/12/93	77	46	62	0.04	0	0	RW-,TRW-	W	9.2	CLDY	3	0
05/13/93	65	42	54	0	0	0		NE	8.8	CLR	11	0
05/14/93	78	42	60	0	0	0		SW	7.6	CLR	5	0
05/15/93	78	56	67	0	0	0		NW	6.4	CLR	0	2
05/16/93	70	46	58	0	0	0		NNW	5.3	CLDY	7	0
05/17/93	74	42	58	0	0	0		S	3.1	PC	7	0
05/18/93	73	45	59	0	0	0		SE	5.7	CLDY	6	0
05/19/93	60	42	51	T	0	0	RW-	N	3.7	CLDY	14	0
05/20/93	63	39	51	T	0	0	RW-	NW	3.3	PC	14	0
05/21/93	69	46	58	0	0	0		NW	4.6	PC	7	0
05/22/93	78	42	60	0	0	0	RW-	S	7.4	PC	5	0
05/23/93	77	56	67	0.53	0	0	TRW-,RW,L	SW	13.1	CLDY	0	2
05/24/93	75	55	65	0	0	0		W	11.6	PC	0	0
05/25/93	68	50	59	0	0	0		NW	5.1	0.0	6	0
05/26/93	79	45	62	0	0	0		SW	4.4	0.0	3	0
05/27/93	79	47	63	T	0	0	RW-	S	9.5	PC	2	0
05/28/93	85	50	68	T	0	0	RW-	SW	9.2	PC	0	3
05/29/93	73	48	61	0.06	0	0	RW-	NE	5.4	PC	4	0
05/30/93	83	55	69	0.78	0	0	TRW	SW	7.1	CLDY	0	4
05/31/93	62	48	55	T	0	0	RW-	N	7.8	PC	10	0
Total/ Average[5]	74.7	51.1	62.9	1.83	0	0		SE	6.9		111	51
Departure from Average	+1.0	-0.6	+0.2	-2.14		+0		S	+2.1		-39	-20

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				June 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
06/01/93	67	41	54	.08	0	0	R-	E	2.9	CLR	11	0
06/02/93	59	51	55	.35	0	0	TRW-,R-	SE	5.2	CLDY	10	0
06/03/93	65	54	60	T	0	0	L-	NE	5.3	CLDY	5	0
06/04/93	66	50	58	.91	0	0	TRW,F	NE	7.1	CLDY	7	0
06/05/93	69	48	59	0	0	0		NW	4.9	CLR	6	0
06/06/93	68	49	59	0	0	0	F	S	6.5	PC	6	0
06/07/93	86	57	72	.02	0	0	TRW-,F	S	9.0	CLDY	0	7
06/08/93	90	66	78	.03	0	0	TRW-	S	13.0	PC	0	13
06/09/93	85	67	76	.01	0	0	TRW-	SW	10.4	CLR	0	11
06/10/93	82	62	72	.06	0	0	TRW-	SW	4.7	PC	0	7
06/11/93	79	63	71	T	0	0	RW-,F	S	2.9	CLDY	0	6
06/12/93	82	64	73	0	0	0		SE	3.2	CLDY	0	8
06/13/93	88	66	77	0	0	0	F	S	3.6	PC	0	12
06/14/93	85	61	73	T	0	0	RW-	NW	6.1	PC	0	8
06/15/93	79	59	69	0	0	0		NW	4.8	CLR	0	4
06/16/93	84	55	70	0	0	0		SE	5.4	CLR	0	5
06/17/93	94	62	78	0	0	0	H	S	7.7	CLR	0	13
06/18/93	89	69	79	.82	0	0	TRW+,RW+ TRW,RW-	W	5.5	PC	0	14
06/19/93	88	70	79	.23	0	0	TRW+,RWR ,L	SW	7.0	CLDY	0	14
06/20/93	82	67	75	.52	0	0	TRW+,RW+ , R,R-,L	W	6.0	CLDY	0	10
06/21/93	83	64	74	0	0	0		NW	4.2	CLR	0	9
06/22/93	87	62	75	0	0	0	F	E	2.4	CLR	0	10
06/23/93	87	66	77	0	0	0		SE	5.5	CLR	0	12
06/24/93	88	69	70	.73	0	0	TRW+,RW +,F	S	8.5	PC	0	14
06/25/93	80	63	62	.04	0	0	R-	SW	5.8	PC	0	7
06/26/93	84	57	71	0	0	0		SW	6.8	CLR	0	6
06/27/93	88	63	76	0	0	0	H	SW	5.6	CLDY	0	11
06/28/93	76	65	71	1.28	0	0	TRW+,RW+ ,RW,R-	S	4.5	CLDY	0	6
06/29/93	83	63	73	.01	0	0	L	E	3.5	CLDY	0	8
06/30/93	85	66	76	.38	0	0	TRW,RW,R	W	6.1	CLDY	0	11
Total/ Average[5]	80.9	60.6	70.8	5.47	0			S	5.8		45	226
Departure from Average	-2.0	-0.2	-1.1	+1.40	0			SW	-0.2		+29	+12

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				July 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
07/01/93	76	66	71	2.04	0	0	TRW+,R,L, RW+,.R	N	3.7	CLDY	0	6
07/02/93	86	56	76	0.70	0	0	TRW+, TRW,F	SSE	4.6	CLDY	0	11
07/03/93	90	67	79	0	0	0	F	S	4.1	CLR	0	14
07/04/93	89	69	79	0	0	0		S	8.7	PC	0	14
07/05/93	89	74	82	0.13	0	0	TRW	S	13.4	CLR	0	17
07/06/93	82	72	77	T	0	0	L	W	6.4	PC	0	12
07/07/93	84	68	76	0.27	0	0	TRW,R,R-,L	S	5.1	CLDY	0	11
07/08/93	89	65	77	0	0	0	F,H	S	5.2	PC	0	12
07/09/93	88	72	80	0	0	0	H	SW	7.5	CLDY	0	15
07/10/93	88	70	70	0.13	0	0	TRW	S	4.9	CLDY	0	14
07/11/93	88	67	78	0.74	0	0	TRW+, TRW,R	SW	5.6	CLDY	0	13
07/12/93	82	63	73	0	0	0		N	3.4	PC	0	8
07/13/93	86	62	74	0.87	0	0	TRW+, RW+,L	SE	4.2	PC	0	9
07/14/93	83	69	76	0	0	0		N	4.2	CLDY	0	11
07/15/93	74	67	71	0.15	0	0	TRW-,R,L	E	3.1	CLDY	0	6
07/16/93	77	71	74	0.52	0	0	R,L,F	E	3.1	CLDY	0	9
07/17/93	86	72	70	0.04	0	0	R,L	E	2.7	CLDY	0	14
07/18/93	91	72	82	1.14	0	0	TRW+,F	SSW	5.3	PC	0	17
07/19/93	85	71	78	0	0	0		NW	5.0	PC	0	13
07/20/93	83	66	75	0	0	0		N	3.0	PC	0	10
07/21/93	78	62	70	0.37	0	0	R,L	NE	4.1	CLDY	0	5
07/22/93	75	62	69	0.06	0	0	R,L	NE	3.7	PC	0	4
07/23/93	79	64	72	0.71	0	0	TRW,R,RW, L	SE	3.6	CLDY	0	7
07/24/93	87	68	78	0.33	0	0	TRW	SE	4.3	CLDY	0	13
07/25/93	90	74	82	0.05	0	0	R-,L,F	SW	5.7	PC	0	17
07/26/93	86	70	78	0	0	0	F	W	3.6	CLR	0	13
07/27/93	91	65	78	0	0	0	F	S	4.2	PC	0	13
07/28/93	87	68	78	0	0	0		W	7.1	PC	0	13
07/29/93	81	64	73	0	0	0		NW	6.3	CLR	0	8
07/30/93	82	63	73	0	0	0		N	3.2	PC	0	8
07/31/93	83	60	72	0.17	0	0	R,RW	S	3.6	PC	0	7
Total/ Average[5]	84.4	67.4	75.9	8.42	0			S	4.9		0	344
Departure from Average	-0.9	+2.6	+0.8	+3.94	0			SW	+0.0		-2	+39

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				August 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
08/01/93	85	67	76	0.13	0	0	TRW,RW, R	W	5.3	PC	0	11
08/02/93	79	60	70	0	0	0		W	5.5	PC	0	5
08/03/93	83	60	72	0.05	0	0	RW	SW	5.3	PC	0	7
08/04/93	76	56	66	0	0	0		NNW	3.0	PC	0	1
08/05/93	74	52	63	0.05	0	0	RW	S	3.0	CLDY	2	0
08/06/93	75	58	67	T	0	0	L	W	4.7	PC	0	2
08/07/93	75	53	64	0	0	0		NW	1.8	PC	1	0
08/08/93	79	54	67	0	0	0		SE	1.5	CLR	0	2
08/09/93	82	57	70	0.44	0	0	TRW,RW,F	S	4.6	PC	0	5
08/10/93	83	66	75	0.26	0	0	R-,L,F	SE	3.5	CLDY	0	10
08/11/93	86	66	76	1.56	0	0	TRW+, RW-,F	SE	1.9	CLDY	0	11
08/12/93	74	67	71	5.32	0	0	TRW+ RW,R,L,F	SSW	3.6	CLDY	0	6
08/13/93	83	67	75	0	0	0	F	NE	2.8	CLDY	0	10
08/14/93	86	68	77	0	0	0		SE	1.4	CLDY	0	12
08/15/93	88	68	78	0.11	0	0	TRW-,RW-F,H	S	5.7	PC	0	13
08/16/93	88	70	79	0.37	0	0	TRW,F,H	W	3.4	CLDY	0	14
08/17/93	89	72	81	0.08	0	0	TRW,A,F	NE	2.5	CLDY	0	16
08/18/93	85	69	77	0	0	0	F	SE	2.8	CLR	0	12
08/19/93	88	70	79	0.98	0	0	TRW+,F	S	4.3	PC	0	14
08/20/93	85	67	76	0	0	0	F	NW	4.5	CLDY	0	11
08/21/93	79	63	71	0	0	0		N	2.8	PC	0	6
08/22/93	80	64	72	0.07	0	0	RW,R-,L,F	SE	3.8	PC	0	7
08/23/93	90	68	79	0.40	0	0	TRW,H,F	S	6.8	CLDY	0	14
08/24/93	87	68	78	0	0	0	F	SW	3.5	CLDY	0	13
08/25/93	89	72	81	0	0	0		SE	3.5	CLDY	0	16
08/26/93	91	72	82	0	0	0	F,H	SSW	3.2	CLR	0	17
08/27/93	91	70	81	0	0	0	F	SW	4.6	PC	0	16
08/28/93	91	72	82	T	0	0	T,L	NE	3.3	CLDY	0	17
08/29/93	91	69	80	0	0	0	T,H	SW	3.8	PC	0	15
08/30/93	89	71	80	0.02	0	0	L,F,H	S	6.0	CLDY	0	15
08/31/93	72	60	66	0.18	0	0	R,R-,L	NE	4.7	CLDY	0	1
Total/ Average[5]	83.6	65.0	74.3	10.02	0	0		SE	3.8		3	299
Departure from Average	+0.6	+2.6	+1.6	+6.00	0			SW	-0.9		-4	+61

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				September 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
09/01/93	78	58	68	0	0	0		SE	4.0	CLR	0	3
09/02/93	79	67	73	2.15	0	0	TRW+,RW+,R,RW-F	S	5.6	CLDY	0	8
09/03/93	75	59	67	.16	0	0	R,R-,L	WNW	3.8	CLDY	0	2
09/04/93	76	55	66	0	0	0		W	3.6	PC	0	1
09/05/93	80	56	68	0	0	0		W	3.1	PC	0	3
09/06/93	66	57	62	.29	0	0	TRW,R, RW,L	N	3.8	CLDY	3	0
09/07/93	73	52	63	0	0	0		NE	2.6	CLR	2	0
09/08/93	74	56	65	.05	0	0	L	N	1.6	CLR	0	0
09/09/93	77	53	65	.08	0	0	TRW-	SW	7.4	PC	0	0
09/10/93	69	48	59	0	0	0		NW	5.4	PC	6	0
09/11/93	71	44	58	0	0	0		S	4.7	PC	7	0
09/12/93	80	57	69	.67	0	0	TRW,R	S	11.0	CLDY	0	4
09/13/93	82	65	74	.03	0	0	RW-,L	S	12.5	CLDY	0	9
09/14/93	81	53	67	2.14	0	0	RW,RW-,R,L	NW	9.6	CLDY	0	2
09/15/93	57	51	54	T	0	0	L	NE	4.9	CLDY	11	0
09/16/93	65	52	59	0	0	0		NE	3.7	CLDY	6	0
09/17/93	69	48	59	0	0	0		NE	2.0	CLDY	6	0
09/18/93	73	47	60	0	0	0		NE	1.7	PC	5	0
09/19/93	74	54	64	T	0	0	L	E	4.3	PC	1	0
09/20/93	72	57	65	0	0	0	F	W	4.3	CLDY	0	0
09/21/93	73	53	63	0	0	0		NW	3.4	CLR	2	0
09/22/93	70	54	62	.68	0	0	TRW,RW+,R,L,F	S	6.5	CLDY	3	0
09/23/93	69	46	58	.07	0	0	R,R-,L,F	NE	3.9	CLDY	7	0
09/24/93	67	45	56	0	0	0	F	ESE	2.8	CLDY	9	0
09/25/93	70	57	64	1.01	0	0	R,R-,L	W	5.5	CLDY	1	0
09/26/93	60	50	55	.64	0	0	R,L	WNW	5.6	CLDY	10	0
09/27/93	54	44	49	0	0	0		W	8.1	CLDY	16	0
09/28/93	68	44	56	0	0	0		WNW	7.0	CLR	9	0
09/29/93	56	38	47	0	0	0		NW	4.3	CLR	18	0
09/30/93	64	33	49	0	0	0		S	7.2	CLR	16	0
Total/ Average[5]	70.7	51.8	61.3	7.97	0	0		NE	5.1		138	32
Departure from Average	-7.0	-3.4	-5.2	+4.61	0	0		SW	+0		+57	-85

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				October 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
10/01/93	72	53	63	0	0	0		SSW	9.1	PC	2	0
10/02/93	62	36	49	0	0	0		WNW	4.8	PC	16	0
10/03/93	69	35	52	0	0	0		SW	7.4	CLR	13	0
10/04/93	78	46	62	0	0	0		SW	7.8	CLR	3	0
10/05/93	66	39	53	0	0	0		NE	2.5	CLR	12	0
10/06/93	79	42	61	0	0	0		S	5.4	CLR	4	0
10/07/93	82	49	66	0	0	0	F	SE	5.2	CLR	0	1
10/08/93	80	52	66	0.50	0	0	TRW,R,L,F	SW	5.0	CLDY	0	1
10/09/93	61	36	49	0.47	0	0	TRW+,R,L	N	9.7	CLDY	16	0
10/10/93	53	33	43	0	0	0		N	1.8	PC	22	0
10/11/93	57	33	45	0	0	0		SW	3.5	CLR	20	0
10/12/93	65	38	52	0	0	0	F	SW	5.4	CLR	13	0
10/13/93	57	36	47	0	0	0		NE	3.5	CLR	18	0
10/14/93	67	36	52	0	0	0		S	3.1	CLDY	13	0
10/15/93	73	44	59	0.16	0	0	TRW,R	S	5.4	CLDY	6	0
10/16/93	67	58	63	2.11	0	0	TRW+,R	S	6.0	CLDY	2	0
10/17/93	58	45	52	0.10	0	0	TRW,L	N	4.4	CLDY	13	0
10/18/93	62	41	52	0.03	0	0	L,F	SE	2.3	CLDY	13	0
10/19/93	62	52	57	T	0	0	L	NE	2.2	CLDY	8	0
10/20/93	58	46	52	0.71	0	0	R,R-,L	NE	4.4	CLDY	13	0
10/21/93	55	36	46	0	0	0		W	8.3	CLR	19	0
10/22/93	62	32	47	0	0	0		W	1.7	CLR	18	0
10/23/93	66	36	51	0	0	0		S	4.3	CLR	14	0
10/24/93	70	39	55	0	0	0		SW	5.2	CLR	10	0
10/25/93	69	38	54	0	0	0		S	4.2	CLR	11	0
10/26/93	62	42	52	0	0	0	F	NW	5.2	PC	13	0
10/27/93	46	29	38	0	0	0		NW	6.0	CLDY	27	0
10/28/93	56	29	43	0	0	0		S	12.4	CLDY	22	0
10/29/93	44	34	39	0	0	0		NW	6.9	CLDY	26	0
10/30/93	39	33	36	0.02	0.1	0	SW-	N	8.0	CLDY	29	0
10/31/93	42	26	34	0	0	0		NW	7.9	PC	31	0
Total/ Average[5]	62.5	39.5	51.0	4.10	0.1	0		SW	5.5		427	2
Departure from Average	-2.6	-4.3	-3.5	+1.42	+0.0			S	-0.6		+78	-14

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				November 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
11/01/93	45	22	34	0	0	0		W	4.5	PC	31	0
11/02/93	47	27	37	0.12	0	0	R-,L	S	9.7	CLDY	28	0
11/03/93	57	40	49	0	0	0	F	SW	11.9	CLDY	16	0
11/04/93	60	40	50	0	0	0	F	S	13.8	CLDY	15	0
11/05/93	50	32	41	T	T	0	L,SW-	W	12.0	CLDY	24	0
11/06/93	33	20	27	0.02	0.2	T	SW-	NW	7.0	CLDY	38	0
11/07/93	39	17	28	0	0	0		S	10.4	CLR	37	0
11/08/93	52	25	39	0	0	0		S	7.7	CLR	26	0
11/09/93	57	26	42	0	0	0		S	1.2	CLR	23	0
11/10/93	55	28	42	0	0	0	F	W	3.4	CLR	23	0
11/11/93	57	29	43	T	0	0	L	SW	7.8	CLDY	22	0
11/12/93	54	46	50	0.43	0	0	TRW,R,L,F	SE	8.7	CLDY	15	0
11/13/93	68	47	58	0.03	0	0	R-,L	S	13.2	CLDY	7	0
11/14/93	48	45	47	1.26	0	0	R,RW-,L	NE	6.8	CLDY	18	0
11/15/93	46	41	44	0.01	0	0	L	W	6.1	CLDY	21	0
11/16/93	46	40	43	0.23	0	0	R,L	SE	4.4	CLDY	22	0
11/17/93	44	32	38	0.68	0	0	R,L	N	10.4	CLDY	27	0
11/18/93	45	31	38	T	0	0	L,F	S	8.0	CLDY	27	0
11/19/93	47	33	40	T	0	0	L	NW	10.8	CLDY	25	0
11/20/93	47	27	37	0	0	0		W	7.2	PC	28	0
11/21/91	51	33	42	0	0	0		SW	13.5	CLR	23	0
11/22/93	55	32	44	0	0	0		SW	6.6	PC	21	0
11/23/93	52	36	44	0	0	0		S	6.2	CLDY	21	0
11/24/93	49	43	46	0.12	0	0	R,L	NE	5.4	CLDY	19	0
11/25/93	45	34	40	0.43	0	0	R	E	5.8	CLDY	25	0
11/26/93	34	14	24	0.60	T	0	R,ZR,IP,S	W	1.8	CLDY	41	0
11/27/93	33	14	24	0.02	0.3	0	S	SSE	5.8	PC	41	0
11/28/93	31	16	24	0.29	3.2	0	S	W	7.1	PC	41*	0
11/29/93	29	20	25	T	T	3	SW-	NNW	6.1	CLDY	40	0
11/30/93	34	23	29	0	0	2		E	3.0	CLDY	36	0
Total/ Average[5]	47.0	30.4	38.7	4.24	3.7	0		S	7.5		781	0
Departure from Average	-3.3	-3.4	-3.4	+1.14	+1.5	0		SW	10.0		+85	+0

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.

Champaign, IL Water Survey Research Center				Local Climatological Data Illinois State Water Survey				December 1993 Summary				
	Temperature			Precip	Snow[1]		Weather	Wind		Sky	Degree Days[2]	
Date	Max.	Min.	Mean	Inches	Inches	Depth	Types[3]	Dir.	Speed	Cover[4]	Heat	Cool.
12/01/93	42	23	33	0	0	2		SE	6.5	CLDY	32	0
12/02/93	53	35	44	0.48	0	0	R,L,F	S	6.7	CLDY	21	0
12/03/93	47	37	42	0.09	0	0	R,L,F	E	3.4	CLDY	23	0
12/04/93	47	37	42	0.19	0	0	R,R-,L	NNE	10.1	CLDY	23	0
12/05/93	42	35	39	0	0	0	F	S	9.3	CLDY	26	0
12/06/93	42	26	34	0.01	T	0	L,SW-	W	11.7	CLDY	31	0
12/07/93	38	26	32	0	0	0		SE	5.5	CLDY	33	0
12/08/93	37	27	32	0	0	0		W	6.5	PC	33	0
12/09/93	54	30	42	T	0	0	L	S	8.5	CLDY	23	0
12/10/93	52	27	40	T	0	0	R-	NW	11.6	PC	25	0
12/11/93	31	19	25	0	0	0		N	6.5	CLR	40	0
12/12/93	39	19	29	0	0	0		S	9.7	CLR	36	0
12/13/93	42	30	36	0.06	0	0	R-,L,IP-	SE	7.1	CLDY	29	0
12/14/93	42	35	39	0.40	0	0	R-,L	E	5.3	CLDY	26	0
12/15/93	42	35	39	T	0	0	L	NE	8.3	CLDY	26	0
12/16/93	45	36	41	0	0	0		NE	4.0	CLDY	24	0
12/17/93	42	36	39	0.05	0	0	R-,L,F	S	6.0	CLDY	26	0
12/18/93	41	33	37	0.10	T	0	R-,L,SW-	W	10.1	CLDY	28	0
12/19/93	36	32	34	T	T	0	L,SW-	SW	6.6	CLDY	31	0
12/20/93	36	28	32	0.14	0.4	0	R-,L,SW	NW	8.4	CLDY	33	0
12/21/93	30	25	28	0	0	0		W	7.4	CLDY	37	0
12/22/93	31	22	27	0.05	0.5	0	SW,SW-	W	7.9	CLDY	38	0
12/23/93	24	18	21	T	T	T	SW	W	6.8	CLDY	44	0
12/24/93	24	18	21	0.04	0.6	1	SW-	W	8.0	CLDY	44	0
12/25/93	25	11	18	0.05	0.7	1	SW	W	11.1	PC	47	0
12/26/93	16	11	14	0.04	0.6	2	SW	NE	5.7	CLDY	51	0
12/27/93	19	11	15	0	0	2		NE	7.1	CLDY	50	0
12/28/93	19	6	13	0	0	2		NE	6.0	PC	52	0
12/29/93	25	7	16	T	T	2	SW-	NW	11.4	PC	49	0
12/30/93	26	-2	12	T	T	2	SW-	SW	10.2	PC	53	0
12/31/93	42	19	31	0	0	2		SSW	10.9	PC	34	0
Total/ Average[5]	36.5	24.3	30.4	1.70	2.8			W	7.9		1,068	0
Departure from Average	+0.0	+2.3	+1.1	-1.32	-3.2			S	+0.0		-49	+0

[1] Snow depth at 7 AM LST.

[2] DEGREE DAYS: Heat and Cool base=65F; Heating/dd July-June. Cooling/dd Jan.-Dec.

[3] WEATHER TYPES: F=Fog; T=Thunderstorm; IP=Ice Pellets; A=Hail; R=Rain; S=Snow; Z=Freezing Precip; D=Dust; H=Haze; BS=BlowingSnow; RW=Rain Showers; SW=Snow Showers; L=Drizzle; INTENSITIES: +heavy; -light; absence of symbol indicates moderate, T = Trace.

[4] Sky 7 AM - 7PM LST. Other data midnight - midnight.

[5] Averages 1961-1990 data.