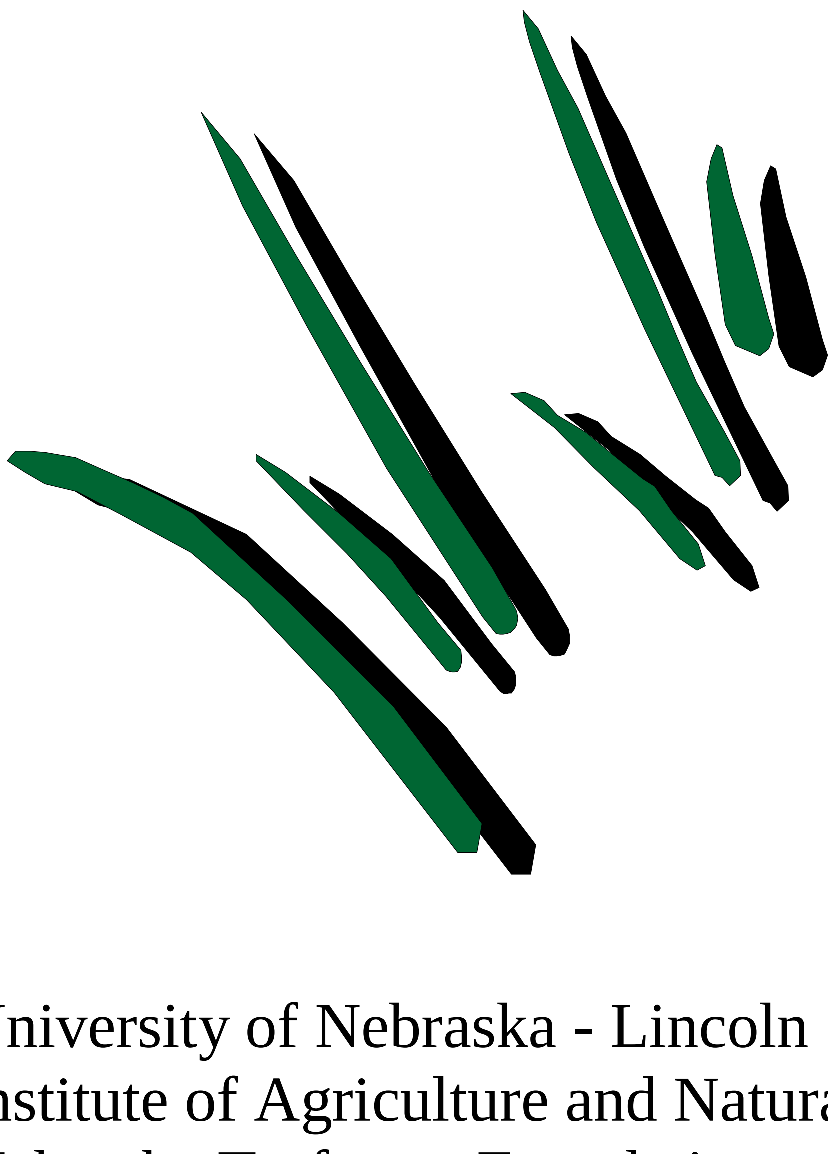
Turfgrass Research Report



1997

University of Nebraska - Lincoln
Institute of Agriculture and Natural Resources
Nebraska Turfgrass Foundation

1997 Turfgrass Research Report

Statement of Purpose

The purpose of the Turfgrass Science Team is to bring together faculty, Staff, graduate students, industry, funding, and other resources in a way that is convenient to work together in mutual benefit of research, extension, and teaching.

Team Mission

The mission of the Turfgrass Science Team is to develop cultivars, cultural practices, curriculum, and outreach programs that conserve water, reduce pesticide use, minimize environmental impact, and enhance the quality of life.

Turfgrass Science Team
University of Nebraska

"the good life needs good turf"

Team Functions
Research
Extension
Education and Training
Outreach/Liason

For more detailed information about the Turfgrass Science Team visit our web pages at: http://hort.unl.edu/turf

1997 Turfgrass Research Report

Project Coordinators: Paul Johnson, Bob Shearman,
Michelle Ternus, Milda Vaitkus
and Steve Westerholt

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Cultivar Trials

Breeding and Genetics Research

Ornamentals Research

Turfgrass Team Members
Faculty

Fred P. Baxendale

Research Emphasis:

- Investigation of the biology, ecology and injury potential of turfgrass arthropods with the goal of developing effective, sustainable and environmentally-responsible IPM approaches for the insects and mites affecting turfgrasses in Nebraska.

Research Emphasis:

- Enhanced understanding of microbial ecology in managed grassland ecosystems, namely golf course putting greens;
- Identification of relationships among microbial communities developed in putting greens in response to management history; and
- Improved understanding of microbial community development in putting greens leading to reduced inputs and disease pressure.

Rhae A. Drijber

Research Emphasis:

- Improved turfgrass weed control practices through integrated turfgrass management practices;
- Enhanced understanding of herbicide efficacy; and
- Integrated approaches to buffalograss management.

Research Emphasis:

- Assessment of accurate pesticide application;
- Sprayer calibration, and nozzle arrangement effects on accurate and uniform applications;
- Reduced pesticide inputs;
- Reduced inputs to optimize economic returns; and
- Use of GPS/GIS technology for site-specific management.

Robert (Bobby) D. Grisso

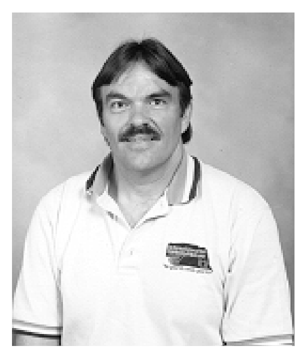
Garald L. Horst

Research Emphasis:

- Xenobiotic remediation by plants and plant-microorganism systems;
- Pesticide and nutrient fate in relationship to environmental and water quality;
- Turfgrass canopy environmental influence on microorganism ecology; and
- Enhanced understanding of environmental quality and sustainability of resource systems.

Research Emphasis:

- Coordination of the integrated pest management for vertebrates;
- Conduct research and outreach programs on wildlife problems in turf, particularly those dealing with moles, voles, ground squirrels, pocket gophers, and Canada geese.



Scott E. Hygnstrom

Research Emphasis:

- Improved understanding of buffalograss breeding and genetics;
- Identification and evaluation of germplasm for turfgrass use;
- Incorporation of molecular techniques in turfgrass development and evaluation;
- Use of genetic transformation in buffalograss cultivar development; and
- Improved turfgrass cultivars and enhanced understanding of turfgrasses.

Paul G. Johnson

Research Emphasis:

- Enhanced understanding of plant biochemistry with emphasis on nitrogen fixation, leghemoglobin and other plant responses.

Robert V. Klucas

Research Emphasis:

- Engineering of devices to quantitatively assess parameters, such as golf ball roll distance and uniformity, shear strength, traffic tolerance and other turfgrass responses of interest.

Michael F. Kocher

Research Emphasis:

- Understanding the interactions of wildflowers and warm-season turfgrass when planted in mixtures;
- Evaluation of turfgrass cultivars and other turfgrass products for use in west central Nebraska.

Dale T. Lindgren

Martin A. Massengale

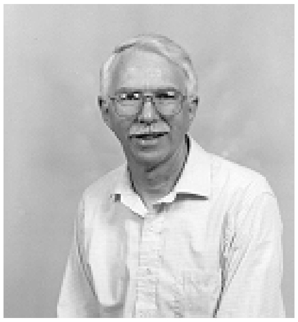
Research Emphasis:

- Administration and facilitation of research activities related to the Center for Grassland Studies, including turfgrass development, evaluation and management, and seed production practices.

Research Emphasis:

- Systems approach to the establishment of native grasses and wildflowers;
- Prairie restoration and management; and
- Herbicide efficacy evaluation.

Robert A. Masters



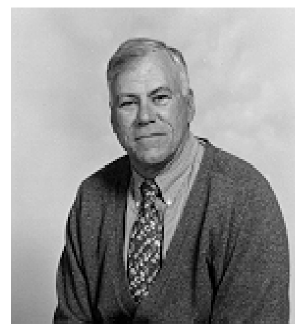
William L. Powers

Research Emphasis:

- Understanding the long-term impacts of golf course putting green grow-in procedures on the soil physical properties associated with putting green performance and function; and
- Determine water infiltration rate, air-filled porosity at 40 cm of suction head, total porosity, bulk density and pore size distribution.

Research Emphasis:

- Development and evaluation of improved buffalograss cultivars that require reduced inputs of water, fertilizer, pesticides and mowing;
- Improved understanding of buffalograss breeding and genetics through traditional and molecular approaches; and
- Use of environmentally sensible turfgrasses.



Terrance P. Riordan

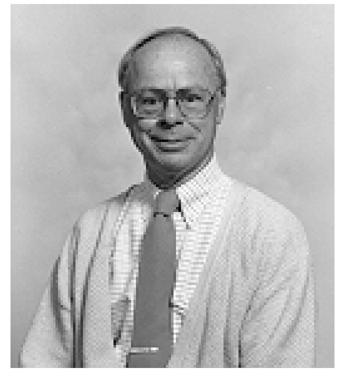
Robert (Bob) C. Shearman

Research Emphasis:

- Integrated turfgrass management systems for sustainable function and performance, using reduced chemical and energy inputs, and water conservation;
- Improved understanding of turfgrass wear tolerance, water conservation, drought resistance, potassium nutrition, and root growth and development;
- Turfgrass species and cultivar recommendations for Nebraska and intensively used sites; and
- Turfgrass and forage seed production for western Nebraska.

Research Emphasis:

- Evaluation of ornamental grasses and ground covers; and
- Development of sustainable landscape systems.



Donald H. Steinegger

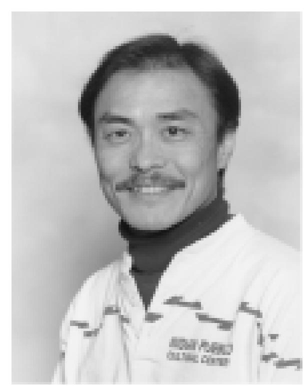
John E. Watkins

Research Emphasis:

- Improved disease diagnosis and management;
- Establish disease management systems for dollar spot and brown patch; and
- Screening of experimental fungicides for turfgrass disease control.

Research Emphasis:

- Identification of microorganisms with potential for biological control of turfgrass diseases;
- Determine mechanisms microbial effects on disease development; and
- Understand environmental impacts on pathogenic fungi and applied antagonists, with emphasis on bacteria on leaf spot, brown patch and dollar spot.



Gary Y. Yuen

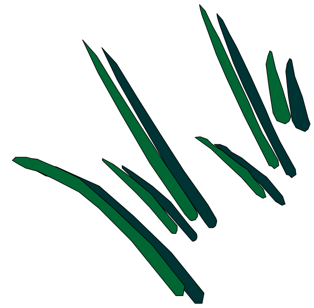
Turfgrass Research Support Staff

Leonard Wit	Unit Manager, JSA Turf and Ornamental Research Facility ,ARDC
Dan Beran	Graduate Student Ph.D., Prairie Restoration
Jane Christensen	Extension Assistant, Plant Pathology
Stephanie Darnell	Research Technologist, Pesticide Fate
Shuizhang Fei	Research Associate, Post-Doctorate, Buffalograss Transformation
Kevin Frank	Graduate Student Ph.D., Buffalograss Management
Loren Giesler	Diagnostic Technologist, Plant Pathology
Amy Grieving	Extension Assitant, Horticulture
Gopalakrishnan Krishnan	Graduate Student Ph.D., Xenobiotic Fate
Tiffany Heng-Moss	Graduate Student Ph.D., Buffalograss Entomology
Cindy Stuefer-Powell	Research Technologist, Agronomy
Wallace Troyer	Technician, Agronomy
Milda Vaitkus	Research Technologist, Turfgrass Management and Physiology
Anthony Weinhold	Technician, Entomology, Graduate Student M.S., Turfgrass Entomology
Steve Westerholt	Technician, Horticulture
Jeff Witkowski	Technician, Horticulture
C. Rebecca Wynne	Graduate Student M.S., Turfgrass Sod Production
Taotao Yu	Graduate Student Ph.D., Buffalograss Transformation

Turfgrass and Ornamental Research Support

AgrEvo USA Co.
American Cyanamid
ARDC
Arrow Seed
Bailey Nurseries
Barenburg Research
Bayer Chemical Corporation
Big Bear Equipment
Bluebird Nursery, Inc.
Campbell's Nursery
Cedar Chemical Company
Crenshaw Turfgrass, Inc.
Cushman-Ransomes
Deere & Company
Dow AgroSciences
EA Engineering Great Plains
Earl May Seed and Nursery, Limited Partnership
Ecogen
Exmark Mfg. Co., Inc.
Farmland, Inc.
Fermenta Plant Protection
FMC Turf and Ornamentals
Garden America, Inc.
Golf Course Supt. Assoc. Of America
The Greenkeeper Company, Inc.
Greenleaf Nursery Company
Hartmann's Plantation, Inc.
Hines Nurseries
Jacklin Seed Co.
Jacobsen/Textron
Johnson Seed Co.
Lake County Nursery, Inc.
Lincoln Water Utilities
Loft's Pedigreed Seed
Midwest Turf and Irrigation
Milorganite Company
Monsanto
Mount Arbor Nurseries
National Turfgrass Evaluation Program (NTEP)
Nebraska Department of Environmental Quality
Nebraska Nursery and Landscape Association (NNLA)
NE Golf Course Supt. Association (NGCSA)
NE Professional Lawn Care Assoc. (NPLCA)
NE Turfgrass Foundation (NTF)
North Star Gardens
Novartis
Organix Supply
Oregon State University
Pennmulch
Pickseed West, Inc.
Proprietary Seeds
Reams Sprinkler and Supply
Rohm and Haas Co.
Rhone Poulenc, Inc.
J. Frank Schmidt and Sons Co.
The Scotts Company
Seeds West, Inc.
Stock Seed
The Toro Company
Todd Valley Farms, Inc.
Troy Biosciences
Turf-Seed & Pure-Seed Testing, Inc.
United Horticulture Supply
United Seeds
United States Environmental Protection Agency
United States Golf Association
United States Department of Agriculture
University of Nebraska Institute of Agriculture and Natural Resources
Water Center
Willamette Seed & Grain
Zajac Performance Seeds
Zeneca, Inc.

Weather Summary for the John Seaton Anderson Turfgrass and Ornamental Research Facility



S.R. Westerholt

Weather patterns for the John Seaton Anderson Turfgrass and Ornamental Research Facility at Mead, Nebraska were near normal for 1997. Generally, temperature and rainfall throughout the growing season were not far from the twelve-year averages (Figures 1 and 2). However, the research area did experience a few slightly below average temperature dips in late April, July, and October, which had an effect on the growing degree day accumulation (Figure 3).

Precipitation for the year was slightly lower for 1997, with a total of 22 inches, down from the twelve-year average of 24 inches.

Evapotranspiration (ET) levels show that a total of about 20 inches of irrigation were required to keep up with water usage through the summer of 1997 (Figure 4).

Figure 1

Average Temperature Variances for Years 1986-97

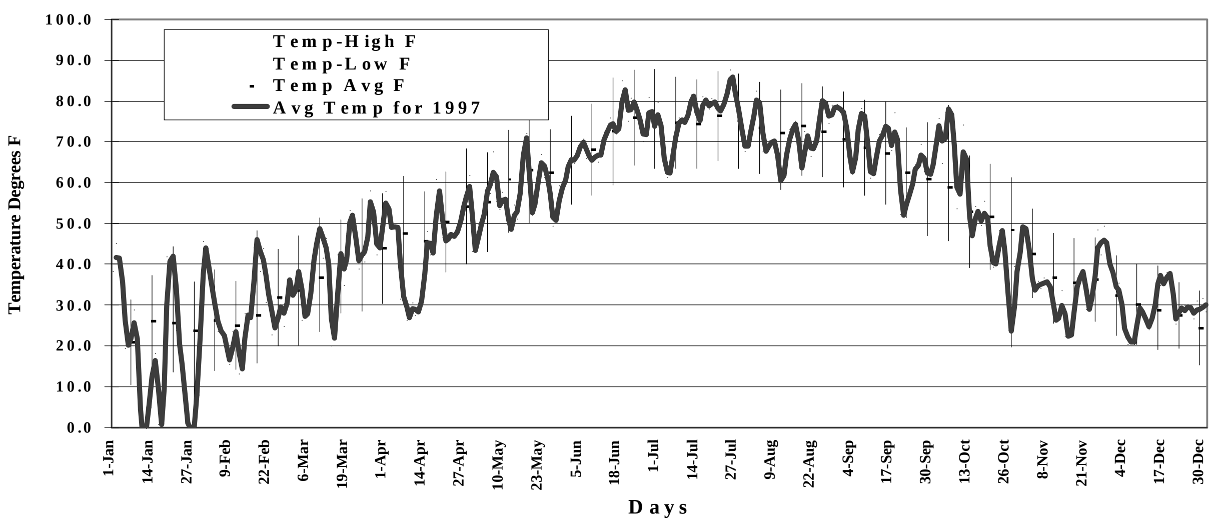


Figure 2

Precipitation Compairson of 1997 vs 12 year average

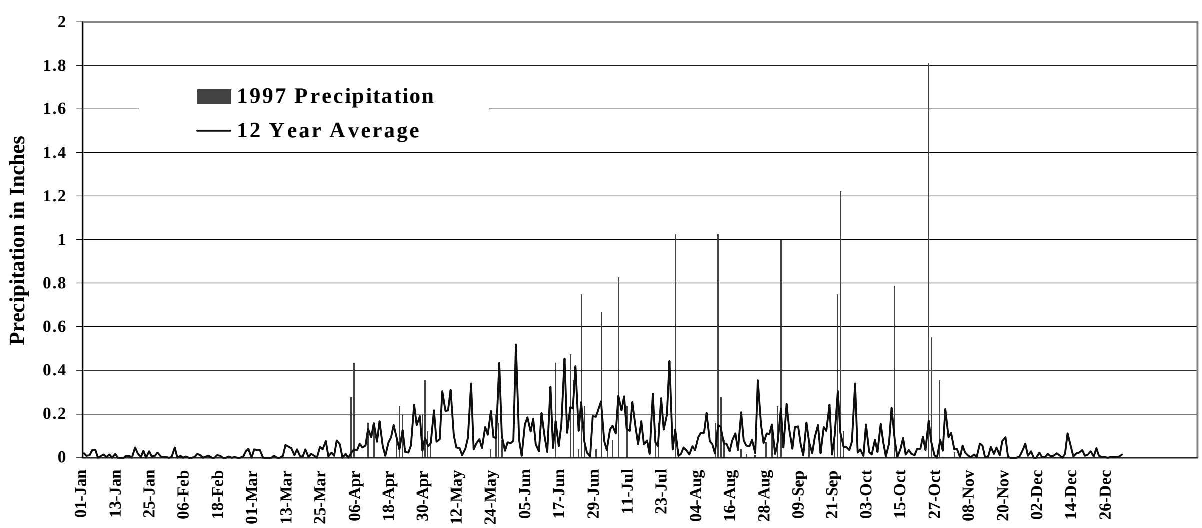


Figure 3 **Accumulative ET Rates vs. Precipitation for Mead, NE. 1997**

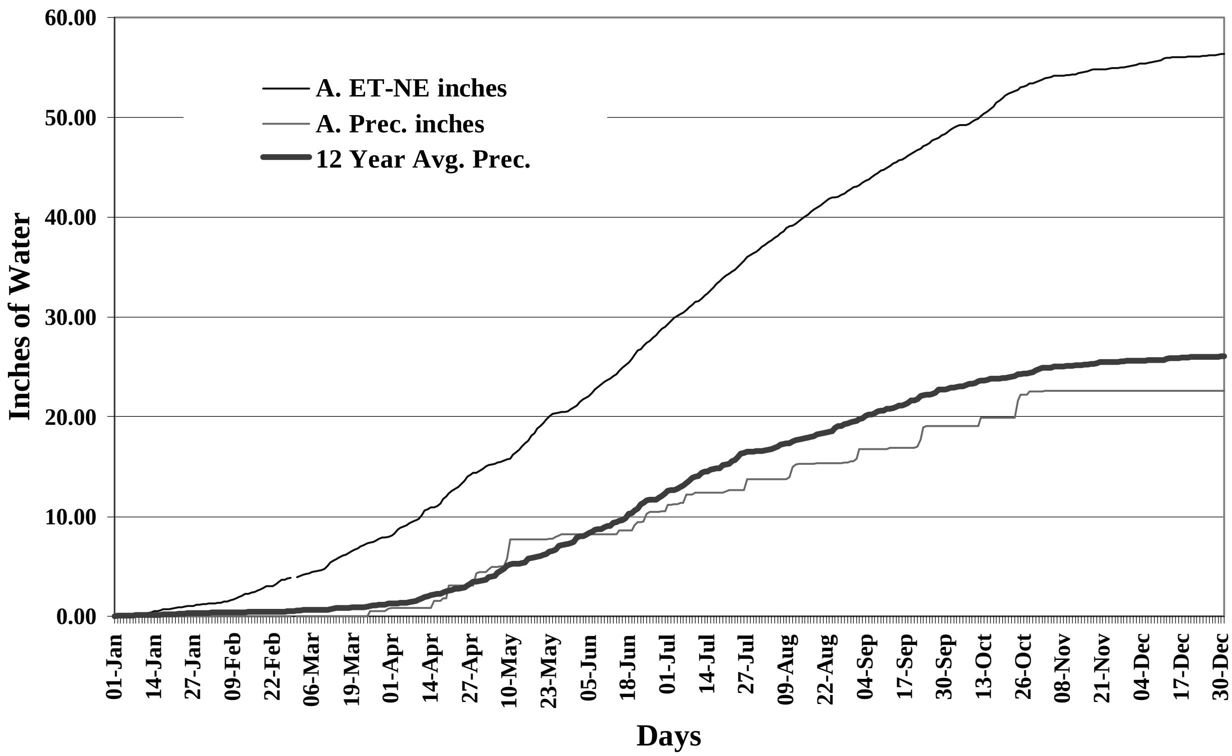
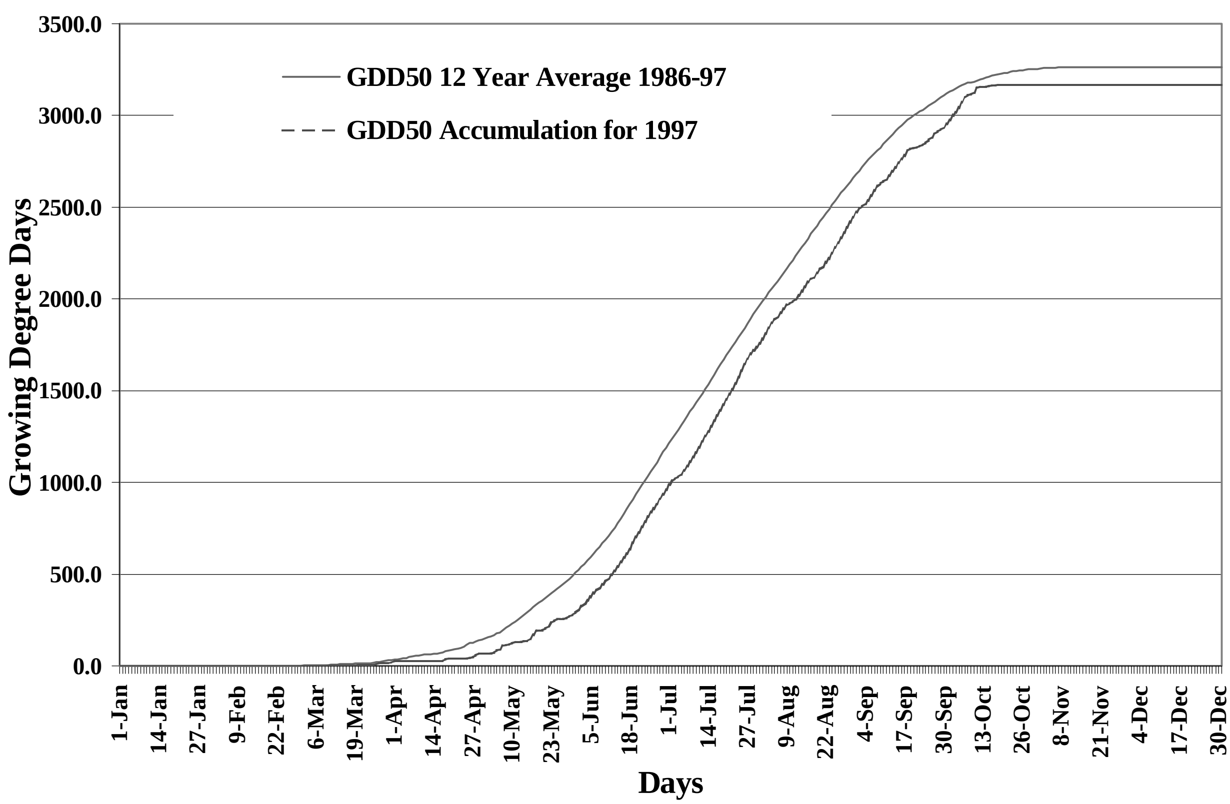


Figure 4 **Growing Degree Accumulation from 1997 vs 12 Year Average**



Evaluation of Nitrogen Carrier Products on Kentucky Bluegrass

R.C. Shearman and M.R. Vaitkus

This study evaluated the performance of four nitrogen carrier products on Kentucky bluegrass turf. Objectives were to compare residual nitrogen effects of the various fertilizer sources on turfgrass color, quality, and clipping weights.

Materials and Methods

The study was conducted in the summer of 1997 at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE. Fertilizer performance was evaluated on a 2 year old stand of Midnight Kentucky Bluegrass on a Sharpsburg silty-clay loam soil. Treatment plots were 3 ft by 6 ft, with 2 ft buffers between replications. Experimental design was a randomized complete block with four replications.

Treatments (Table 1) were applied by hand on June 18, 1997 and watered in with an irrigation of 0.5 inches. Turfs were mowed weekly at 2.5 inches with clippings removed. Irrigation was applied at 80% ETp; application rates were adjusted every three to four days.

Turfgrass color and quality were rated visually on a weekly basis until differences were no longer evident. Standard National Turfgrass Evaluation Program (NTEP) procedures were used. Turfgrass color was evaluated on a scale of 1 to 9 , with 1 = straw-colored and 9 = dark green. Turfgrass quality ratings were based on a 1 to 9 scale, with 1 = lowest, 9 = highest, and 6 = acceptable quality.

Weekly clipping yields were taken for 10 weeks after treatment. Clippings were harvested with an 18" reel mower set at 2.5 inches. One mower pass through the center of each plot was made; clippings were bagged and weighed wet; dried 24 hours at 70ºC and then weighed dry.

Results

Carriers influence turfgrass color from two to four weeks after treatment application (Table 2). Magic Carpet fertilizer had significantly greener color than the control during this entire period, while urea showed some color differences at two and three weeks after treatment. There were no visible differences among the treatments or between the treatments and the untreated control by five weeks after application.

One week after treatment application there were no significant differences in quality among treatments (Table 3). At two weeks, Urea, Magic Carpet, and Luxacote had significantly higher quality than the control. At four weeks after application, quality of all the treatments was significantly higher than that of the control. By five weeks after application, there were no significant visual differences in turfgrass quality among treatments or between treatments and the control.

No significant differences in clipping yield wet weight were observed one week after treatment application (Table 4). At two, three, and four weeks, all the treatments had significantly greater clipping wet weight yield than the untreated control. Among the fertilizer treatments, Magic Carpet had the greatest clipping wet weight yields during this period. Magic Carpet also had greater yield than the untreated control through nine weeks after application. Luxacote had higher yields than the control at six and eight weeks after treatment. No differences in wet weight among the fertilizer treatments or the treatments and the control were detected nine and ten weeks after treatment.

Treatment dry weight yields were not significantly different than the control one week after treatment. Magic Carpet and Luxacote clipping dry weight yields were greater than the control two weeks after treatments and by the third week, all treatments had significantly greater dry weight yields than the control (Table 5). Among the treatments, Magic Carpet and Luxacote had the highest clipping dry weight yields three weeks after treatment. Magic Carpet also had higher clipping dry weight yields than the rest of the treatments at four weeks after treatment and higher dry weight yields than the control through eight weeks. At five and six weeks Luxacote dry weight yields were also higher than the control. At nine and ten weeks, no treatments differed in yield from the control.

Conclusions

Turfgrass color and quality differences were recognizable for the first four weeks after treatment. Treatment effects on wet and dry weight peaked at two to four weeks after treatment and no treatment effects were apparent beyond nine weeks.

Magic Carpet showed the greatest response in turfgrass color, quality, and clipping yields of all the treatments. Urea and Luxacote treatment results also had some increase in color, quality, and clipping yield, although their treatment effects are not as pronounced or as consistent as those for Magic Carpet.

Table 1. Terra Inc. Nitrogen Carrier Products and their rate of application in this study.

Product	**Rate (N/1000 $ft^{2)}$**	**Lbs Product/1000 ft^2**
46-0-0 (Urea)	1	2.17
32-2-10 (Magic Carpet)	1	3.13
19-5-9 (Driver’s Edge)	1	5.26
20-2-10 (Luxacote)	1	5.00
18-3-18 (Vicksburg/Driver’s Edge)	1	5.56
Untreated Control	0	0

Table 2. Turfgrass color, evaluated on a scale of 1 to 9, with 1 = straw color and 9 = dark green.

	Weeks after Application				
Product	**1**	**2**	**3**	**4**	**5**
46-0-0 (Urea)	8.5a†	7.5a	8.0ab	7.3ab	7.5a
32-2-10 (Magic Carpet)	8.5a	7.5a	8.8a	7.8a	7.3a
19-5-9 (Driver's Edge)	8.8a	7.0ab	7.8bc	7.0ab	8.3a
20-2-10 (Luxacote)	8.5a	7.3ab	8.3ab	7.0ab	7.8a
18-3-18 (Vicksburg/Driver's Edge)	8.8a	6.5ab	7.5bc	6.5b	7.8a
Untreated Control	9.0a	6.3b	7.0b	6.3b	7.5a
LSD (0.05)	**0.7**	**1.0**	**0.8**	**1.2**	**1.1**

Table 3. Turfgrass quality, evaluated on a scale of 1 to 9, with 1 =lowest quality and 9 = a very dense, uniform stand.

	Weeks after Application				
Product	**1**	**2**	**3**	**4**	**5**
46-0-0 (Urea)	7.8a	8.0a	7.8a	8.5ab	8.5a
32-2-10 (Magic Carpet)	7.5a	7.8a	7.5ab	9.0a	8.0a
19-5-9 (Driver's Edge)	7.8a	7.0b	7.5ab	8.5ab	8.5a
20-2-10 (Luxacote)	7.5a	7.8a	7.8a	8.8ab	8.5a
18-3-18 (Vicksburg/Driver's Edge)	7.8a	7.0b	7.3ab	8.3b	8.8a
Untreated Control	8.0a	6.5b	6.8b	7.5c	8.3a
LSD (0.05)	**0.7**	**0.7**	**0.9**	**0.7**	**0.9**

† Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Table 4. Turfgrass clipping wet weights (grams).

	Weeks after Application									
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
46-0-0 (Urea)	27.17a	13.39a	5.68ab	10.77b	1.93ab	1.85ab	1.96ab	1.66abc	2.61a	0.50a
32-2-10 (Magic Carpet)	27.33 a	16.19a	7.0a	16.42a	3.00a	3.21a	2.62a	2.57a	3.63a	0.54a
19-5-9 (Driver's Edge)	16.09a	9.77a	3.30cd	7.57b	1.11b	0.62b	0.72b	0.74bc	1.71a	0.63a
20-2-10 (Luxacote)	18.62a	15.36a	6.15a	10.10b	1.69b	3.40a	2.5ab	2.21ab	3.45a	0.62a
18-3-18 (Vicksburg/ Driver's Edge)	20.20a	9.58a	4.29bc	9.97b	1.42b	2.18ab	1.54ab	1.39abc	2.92a	0.51a
Untreated Control	16.92a	4.22a	1.75d	3.51c	0.65b	0.48b	0.57b	0.44c	0.90a	0.47a
LSD (0.05)	**19.02**	**10.32**	**1.72**	**3.91**	**1.29**	**1.81**	**1.79**	**1.74**	**3.84**	**0.52**

Table 5. Turfgrass clipping dry weights (grams).

	Weeks after Application									
Product	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
46-0-0 (Urea)	10.81a	5.88ab	2.37ab	4.66b	0.61ab	0.79ab	0.90ab	0.73abc	1.30a	0.11a
32-2-10 (Magic Car-pet)	11.09a	7.01a	2.95a	6.69a	1.35a	1.35a	1.27a	1.10a	1.81a	0.11a
19-5-9 (Driver's Edge)	6.69a	4.35ab	1.34cd	3.33b	.015bc	0.15b	0.26b	0.30bc	0.82a	0.15a
20-2-10 (Luxacote)	7.53a	6.64a	2.61a	4.40b	1.47ab	1.47a	1.00ab	0.97ab	1.70a	0.14a
18-3-18 (Vicksburg/ Driver's Edge)	8.02a	4.35ab	1.81bc	4.13b	0.90bc	0.90ab	0.74ab	0.63abc	1.44a	0.12a
Untreated Control	6.73a	1.99b	0.67d	1.54c	0.15c	0.15b	0.18b	0.14c	0.38a	0.06a
LSD (0.05)	**7.0**	**4.41**	**0.72**	**1.54**	**0.81**	**0.81**	**0.90**	**0.75**	**1.90**	**0.24**

Fertility and Mowing Effects on Buffalograss

K. Frank, T.P. Riordan and R.E. Gaussoin

'Cody', 'Texoka', '378', and NE 91-118 buffalograsses were planted at locations in Nebraska, Utah, and Kansas in 1995 to test the effect of nitrogen fertilization and mowing height on turf-type buffalograsses. In 1996 and 1997, mowing heights of 2.5, 5.1, and 7.6 cm and nitrogen treatments of 0, 2.4. 5, 10, and 20 g N m^{-2} $year^{-1}$ were imposed to identify best management practices for turf-type buffalograss.

At the Nebraska site, NE 91-118 and 378 had the highest quality ratings at the 2.5 cm mowing height in both 1996 and 1997 (Table 1). Cody and Texoka had unacceptable quality ratings (i.e. < 6) at the 2.5 cm mowing height at both the Nebraska and Utah sites in 1996 and 1997. Cody and Texoka had the highest quality ratings at 7.6 cm and NE 91-118 and 378 had unacceptable quality at 7.6 cm at the Nebraska site in 1997. When mowed at 5.1 cm, all cultivars had acceptable buffalograss quality, with the exception of Texoka at the Utah site.

The results from the Nebraska site indicate that, among entries, NE 91-118 showed the greatest improvement in quality with increasing nitrogen rates. At the Kansas and Utah sites, NE 91-118 had the best quality at 0 and 2.4 g N m^{-2} $year^{-1}$. With the exception of Texoka at the Utah site, all entries had acceptable buffalograss quality at 10 g N m^{-2} $year^{-1}$.

Management recommendations for 378 and NE 91-118 are 2.5 or 5.1 cm mowing heights and a nitrogen rate of 10 g N m^{-2} $year^{-1}$. Recommendations for Cody and Texoka are 5.1 or 7.6 cm mowing heights and a nitrogen rate of 10 g N m^{-2} $year^{-1}$.

Table 1. Quality ratings for entry and mowing height combinations at the Nebraska site two weeks after the second nitrogen application in 1997.

Entry/Date	**Mowing Height**		
Year: 1996	**2.5 cm**	**5.1 cm**	**7.6 cm**
NE 91-118	5.85† Ab	6.19 Aa	5.97 Bb
378	5.84 Ab	6.19 Aa	6.16 Aa
Cody	5.53 Bb	6.17 Aa	6.15 Aa
Texoka	5.16 Cc	5.87 Bb	6.09 Aa
Year: 1997			
NE 91-118	6.04 Aa	5.96 Aa	5.60 Bb
378	6.04 Aa	6.21 Aa	5.63 Bb
Cody	5.63 Ba	6.03 Aa	5.92 Aa
Texoka	5.16 Cb	6.12 Aa	6.09 Aa

Means within columns followed by the same capital letter are not significantly different (p=0.05; LSD).
Means within rows followed by the same small letter are not significantly different (p=0.05; LSD).
† Buffalograss quality rated from 1-9, with 9 = excellent, 6 = acceptable, and 1 = poor.

Table 2. Quality ratings for entry and nitrogen rate combinations at the Nebraska, Kansas, and Utah sites at two weeks after the second nitrogen application in 1997.

Entry	**Nitrogen application rate ($g\ N\ m^{-2}\ year^{-1}$)**				
Location: Nebraska	**0†**	**2.4**	**5.0**	**10**	**20**
NE 91-118	4.56‡ Ce	5.49 Bd	5.96 ABc	6.51 Ab	6.82 Aa
378	5.36 Ae	5.73 Ad	6.07 Ac	6.24 Bb	6.40 Ca
Cody	4.69 Be	5.60 Bd	5.84 Cc	6.47 Ab	6.69 Ba
Texoka	4.47 Ce	5.58 Bd	5.91 BCc	6.40 Ab	6.60 Ba
Location: Kansas					
NE 91-118	5.56 Ae	6.04 Ad	6.20 Ac	6.40 Bb	6.67 Aa
378	4.69 Bd	5.71 Bc	5.93 Bb	6.62 Aa	6.56 ABa
Cody	4.60 Be	5.60 Bd	5.89 Bc	6.11 Cb	6.51 Ba
Texoka	3.84 Cd	5.27 Cc	5.62 Cb	6.16 Ca	6.22 Ca
Location: Utah					
NE 91-118	4.56 Ad	5.33 Ac	5.33 Ac	6.00 Ab	6.78 Aa
Cody	3.89 Be	4.67 Bd	5.22 Ac	6.11 Ab	6.89 Aa
Texoka	3.89 Bd	4.11 Cc	5.00 Ab	5.33 Bb	6.11 Ba

Means within columns followed by the same capital letter are not significantly different (p=0.05; LSD).
Means within rows followed by the same small letter are not significantly different (p=0.05; LSD).
† Nitrogen rates - $g\ N\ m^{-2}\ year^{-1}$
‡ Buffalograss quality rated from 1-9, with 9 = excellent, 6 = acceptable, and 1 = poor.

Nitrogen Partitioning in Buffalograss and Other Turfgrasses

K. Frank, T.P. Riordan and R.E. Gaussoin

Buffalograss is cited in numerous sources as having minimal response to fertilizer nitrogen applications, but to date no research has investigated the fate of fertilizer nitrogen applied to buffalograss. Information on fertilizer nitrogen fate in turf-type buffalograss is not available and comparisons with nitrogen fate in other turfgrass species would be valuable to identify differences in nitrogen use. The objectives of this research will be to determine the quantity and turnover rate of soil and fertilizer nitrogen in aboveground vegetation, thatch, roots, and soil for three turfgrass species. Field experiments to determine the fate of nitrogen fertilizer applied to three turfgrass species (buffalograss, Kentucky bluegrass, and tall fescue) were initiated in 1997 at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, Nebraska.

The total amount of actual nitrogen that will be applied each year to a 9 m^2 plot is 0, 10, and 20 g N m^{-2}. The nitrogen amounts will be split among four applications for Kentucky bluegrass and tall fescue and over two equal applications for buffalograss. In 1997, 5% ^{15}N enriched NH_4NO_3 was applied on one of the application dates to all plots. All other nitrogen applications in the first and second year will use an unlabeled NH_4NO_3 fertilizer. Plots will be randomly sampled prior to each fertilizer application to analyze for nitrogen content in plant and soil fractions. Cores will be divided into thatch, verdure, roots, and soil components. Because buffalograss has no thatch layer, all above-ground vegetation will be analyzed together. The soil cores will be partitioned to four depths and analyzed for total N, NH4+-N, NO3--N, and N-isotope ratio. Roots will be washed from the remaining composite soil samples, dried at 60°C, weighed, and total N and N-isotope ratio determined. Results are not yet available as data from 1997 are currently being analyzed.

Irrigation and Potassium Management on a Kentucky Bluegrass Fairway

R. C. Shearman, R. E. Gaussoin, K. Frank, and M. R. Vaitkus

Introduction

Kentucky bluegrass fairways are subject to summer stress due to high temperatures and increased water use. This study was initiated with an overall goal of determining the influence of irrigation and potassium treatments on Kentucky bluegrass fairway performance and stress tolerance. Specific objectives of this study include: 1) the observation of treatment interactions, 2) the potential for water conservation, 3) the impacts on soil reaction and chemical properties, and 4) the influence on tissue nutrient content.

Materials and Methods

The study was conducted on a Kentucky Bluegrass stand established in 1983 and maintained under fairway conditions. Turfs were mowed at 0.5 inches four to five times per week with clippings removed. Plots were core-cultivated in early May and cores removed.

The experimental design was a split-plot with treatments in a randomized complete block. Main plots (30' X 30') were irrigation treatments of 40, 60 and 80% potential evapotranspiration (ETp) rates, based upon the Nebraska modified Penman equation. Sub-plots (15' X 15') were KCl at rates of 0, 2, 4, and 6 lbs K/1000ft^2/season.

In April the turf was watered uniformly to ensure adequate water in the soil profile. Subsequently, irrigation was applied daily and the ETp treatments were adjusted on a three or four day cycle. The irrigation schedule of 40, 60 and 80% ETp was followed from mid-April through the growing season.

Potassium (K) treatments were applied with a Gandy spreader in mid-May, mid-June, mid-July, and mid-September. Nitrogen was applied at a rate of 4 lbs/1000ft^2/season divided into 1.0 lb/1000ft^2 applications in mid-May and mid-October and 0.5 lb/1000ft^2 applications in mid-June, July, August, and September. Soil test results indicated that no additional phosphorous was required. Herbicides, fungicides, and insecticides were applied on an as-needed basis. Pendulum was applied at 1.5 lbs/acre (0.9 lbs a.i./acre) on April 28, 1997; Dimension was applied at 2 qt/acre (0.5 lbs a.i./acre) on June 26, 1997; Merit was applied at 6.4 oz/acre (0.3 lbs a.i./acre) on June 30, 1997; Chipco 26019 was applied at 3 oz/acre (0.05 lbs a.i./acre) on July 14, 1997; and Trimec Classic was applied at 4 pt/acre (1.7 pt a.i./acre) on October 9, 1997.

Traffic treatments were applied in mid-July. The traffic treatments involved 600 revolutions/plot (taking approximately 1.5 hours). One to two days after treatment, when trafficked turf had strawed, visual ratings of quality were made. Quality ratings were made on a scale of 1 to 9, with 1 indicating strawed turf and 9 equal to highest quality. At this time verdure was also sampled from trafficked and adjacent untrafficked areas using a 4" cup cutter. Evaluations were made weekly until no differences were observed. Additional verdure samples were taken 3 weeks after traffic treatments.

Plant tissue was sampled on July 22 and October 14. Clippings were harvested with an 18" reel mower set at 0.25 inches. One mower pass through the center of each plot was made and clippings were bagged, dried 24 hours at 70°C and then sent to the University of Nebraska Soil and Plant Analytical laboratory for analysis.

Monthly weather parameters for the 1997 growing season are given in Table 1. Irrigation treatments based on percentage ETp differed significantly (Table 2). The 40% and 60% ETp treatments used 62% and 27% as much water as the 80% ETp treatment, respectively. Turfgrass quality differed at times during the growing season with the 40% ETp treatment consistently producing the poorest quality and 80% ETp was consistently the best quality (Table 3). During the 1997 growing season the 60% ETp treatment provided excellent turfgrass quality with significant water conservation. These results suggest the potential for considerable water savings without sacrificing turfgrass quality. Manipulating irrigation applications based on crop coefficients ranging between 60% and 80% might well be suggested as a program for water conservation under our growing conditions. This is particularly true when considering low evaporative demand periods occurring during spring and fall.

Preseason soil analyses results reflecting the previous season treatment effects indicated that only soil K, exchangeable K and soil S differed by treatments (Table 4). All K treatments, including the control, exceeded the recommended level for potassium applications. The post-season soil test results were corrected by covariate analysis using the preseason test results (Table 5). Irrigation treatments had a significant impact on pH, and exchangeable Na. The effect on pH was significant, but was doubtfully important biologically. Soil potassium, Chloride, exchangeable K, exchangeable Mg, and exchangeable Ca differed by K treatment. Plant tissue nutrient content results, expressed on a dry weight basis, differed for K, Cl, Ca, Na, S, and Cu by K treatment (Table 6), while P and K tissue contents differed by irrigation treatments.

Table 1 . Monthly weather parameters; total precipitation, total evapotranspiration (ET), mean monthly maximum and minimum air and soil temperature. Mead weather station data, 1997. Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

Date	Precip.	ET	Mean Air Temperature		Mean Soil Temperature @4in	
	(in.)	(in.)	Max. °F	Min. °F	Max. °F	Min. °F
April	2.1	4.1	55.7	33.4	46.1	46.1
May	0.7	7.7	70.2	50.3	57.0	56.1
June	2.3	8.1	84.7	59.8	72.3	70.5
July	3.2	7.8	86.9	64.6	78.0	76.6
August	1.8	5.7	82.9	61.4	75.3	74.6
September	3.5	5.1	78.8	54.0	68.8	69.3
October	3.5	3.9	66.0	40.6	56.2	57.5

Table 2. Water Use expressed in gallons. Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

ETp	April	May	June	July	August	September	October	Total
40%	505	1329	794	813	1354	715	653	7425
60%	546	1948	1048	1088	1609	985	922	9453
80%	570	2746	1401	1465	2161	1276	1306	11,998
LSD (0.05)	**ns**	**323**	**91**	**84**	**141**	**83**	**173**	**1140**

Table 3. Turfgrass Quality as influenced by Irrigation and Potassium Treatments. Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

Treatment	**Turfgrass Quality†**						
Irrigation	**5/19**	**6/17**	**7/21**	**8/13**	**9/16**	**10/22**	**MEAN**
40% ETp	7.7	7.1b	6.7c	7.9	7.3	7.3	7.3b
60% ETp	7.9	7.4ab	7.3b	8.0	7.6	7.4	7.6a
80% ETp	7.8	7.8a	7.8a	7.9	7.5	7.3	7.7a
LSD (0.05)	**ns**	**0.5**	**0.5**	**ns**	**ns**	**ns**	**0.3**
Potassium ‡							
0	7.7b	7.2b	7.2	8.2	7.4	7.7a	7.5
2	8.0a	7.2b	7.2	7.9	7.5	7.4ab	7.5
4	7.6b	7.6ab	7.3	7.8	7.5	7.2b	7.5
8	7.8ab	7.8a	7.4	7.8	7.4	7.1b	7.6
LSD (0.05)	**0.3**	**0.4**	**ns**	**ns**	**ns**	**0.4**	**ns**

† Evaluated on a scale of 1 to 9 with 1 equal to lowest quality and 9 equal to highest quality.
‡ Potassium treatments expressed as pounds potassium per 1000 ft^2 per growing season.

Table 4. Pre-Season Soil Analyses as influenced by Irrigation and Potassium Treatments (Sampled 4/2/97). Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

Treatment	pH	K † ppm	Bray P ppm	O.M. %	Cl ppm	CEC† cmol/kg	K exch† cmol/kg	Na exch† cmol/kg	Mg exch† cmol/kg	Ca exch† cmol/kg	S† ppm
Irrigation											
40% ETp	7.2	661	28.2	3.0	10.5	35.2	1.8	0.3	4.3	17.3	9.3
60% ETp	7.2	690	26.6	3.0	11.8	36.5	2.0	0.3	4.5	17.6	10.6
80% ETp	7.2	691	31.8	3.1	11.2	35.9	1.9	0.3	4.3	17.4	7.3
LSD (0.05)	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**
Potassium ‡											
0	7.2	559.5c	26.3	3.0	10.6	35.7	1.6c	0.3	4.3	17.4	7.8b
2	7.2	626.8bc	31.0	3.1	10.6	36.1	1.8bc	0.3	4.3	17.6	6.4b
4	7.2	677.6b	29.8	3.0	11.4	35.7	1.9b	0.3	4.4	17.6	9.3ab
8	7.2	858.3a	28.4	3.1	12.1	35.9	2.4a	0.3	4.3	17.2	12.7a
LSD (0.05)	**ns**	**105.7**	**ns**	**ns**	**ns**	**ns**	**0.3**	**ns**	**ns**	**ns**	**3.8**

† Interaction of Irrigation and PotassiumTreatments significant (LSD $p<0.05$)

Table 5. Post-Treatment Soil Analysis Results (10/14/97) as Influenced by Irrigation and Potassium Treatments. Covariate analysis using pretreatment K as the covariate. Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

Treatment	pH	K ppm	Bray P ppm	O.M. %	Cl ppm	CEC cmol/kg	K exch cmol/kg	Na exch cmol/kg	Mg exch cmol/kg	Ca exch cmol/kg	S ppm
Irrigation											
40% ETp	7.24b	738	26.1	3.9	17.8	34.9	2.0	0.31c	4.2	17.9	6.7
60% ETp	7.32a	711	27.4	3.5	16.8	36.6	2.0	0.39b	4.8	19.0	7.8
80% ETp	7.36a	710	30.9	3.3	12.0	38.2	2.0	0.44a	5.0	19.6	7.5
LSD (0.05)	**0.07**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**0.03**	**ns**	**ns**	**ns**
Potassium †											
0	7.3	472.0d	29.4	3.5	8.6b	36.3	1.3d	0.4	4.77a	19.51a	6.6
2	7.3	635.4c	29.9	3.5	10.5b	36.4	1.8c	0.4	4.77a	19.14a	7.0
4	7.3	770.8b	25.7	3.6	18.3a	36.8	2.2b	0.4	4.52b	18.43b	7.7
8	7.3	1000.5a	27.7	3.7	24.6a	36.7	2.8a	0.4	4.52b	18.17b	8.0
LSD (0.05)	**ns**	**46.6**	**ns**	**ns**	**6.9**	**ns**	**0.1**	**ns**	**0.16**	**0.56**	**ns**

† Potassium treatments expressed as pounds potassium per 1000 ft^2 per growing season.

Table 6. Mid-Season Plant Analyses as influenced by Irrigation and Potassium Treatments (sampled 7/22/97). Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

Treatment	N %	Na %	Mg %	Si %	P %	S %	Cl %	K %	Ca %	Mn ppm	Fe ppm	Cu ppm	Zn ppm
Irrigation													
40% ETp	3.5	0.2	0.2	4.7	0.4	0.4	1.1	2.3	0.68a	46.5	154	12.8	42.3
60% ETp	3.5	0.2	0.2	4.7	0.4	0.5	1.0	2.3	0.65ab	42.1	128	13.1	43.8
80% ETp	3.7	0.2	0.2	4.7	0.5	0.5	1.1	2.4	0.62b	43.1	110	13.6	45.4
LSD (0.05)	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**0.04**	**ns**	**ns**	**ns**	**ns**
Potassium†													
0	3.6	0.14b	0.21ab	4.6	0.44a	0.5	1.0	2.3	0.67a	42.8bc	121	13.3	44.9
2	3.7	0.17b	0.20b	4.6	0.43c	0.4	1.1	2.3	0.65a	46.2a	135	13.5	44.0
4	3.6	0.20ab	0.23a	4.7	0.43b	0.5	1.1	2.3	0.65a	45.0ab	143	13.4	44.7
8	3.5	0.24a	0.22ab	4.8	0.42d	0.4	1.0	2.3	0.62b	41.7c	124	12.6	42.4
LSD (0.05)	**ns**	**0.06**	**0.03**	**ns**	**0.01**	**ns**	**ns**	**ns**	**0.03**	**3.0**	**ns**	**ns**	**ns**

† Potassium treatments expressed as pounds potassium per 1000 ft^2 per growing season.

Table 7. Post-Season Plant Analyses on a dry weight basis as influenced by Irrigation and Potassium Treatments (sampled 10/14/97). Irrigation and Potassium Management on a Kentucky Bluegrass

Treatment	N %	Na %	Mg %	Si %	P %	S %	Cl %	K %	Ca %	Mn ppm	Fe ppm	Cu ppm	Zn ppm
Irrigation													
40% ETp	3.6	0.2	0.2	6.2	0.42a	0.4	0.9	2.60a	0.6	56.4	133	11.6	43.6
60% ETp	3.5	0.2	0.2	6.3	0.40ab	0.4	0.9	2.51ab	0.6	47.4	110	11.4	45.1
80% ETp	3.5	0.2	0.2	6.5	0.37b	0.4	0.9	2.48b	0.6	47.1	127	11.4	45.4
LSD (0.05)	**ns**	**ns**	**ns**	**ns**	**0.04**	**ns**	**ns**	**0.09**	**ns**	**ns**	**ns**	**ns**	**ns**
Potassium†													
0	3.6	0.11b	0.2	6.3	0.4	0.44a	0.82c	2.4c	0.61a	49.4	137	12.6a	46.7
2	3.6	0.19a	0.2	6.2	0.4	0.41ab	0.85bc	2.5b	0.59ab	49.9	128	11.3b	45.1
4	3.5	0.21a	0.2	6.5	0.4	0.40b	0.88b	2.6b	0.58b	47.4	117.	11.1b	44.2
8	3.5	0.19a	0.2	6.2	0.4	0.39b	0.94a	2.7a	0.53c	54.6	110	10.9b	42.9
LSD (0.05)	**ns**	**0.06**	**ns**	**ns**	**ns**	**0.03**	**0.05**	**0.08**	**0.03**	**ns**	**ns**	**1.0**	**ns**

† Potassium treatments expressed as pounds potassium per 1000 ft^2 per growing season.

Table 8. Response to Summer Traffic treatments as influenced by Irrigation Treatments. Irrigation and Potassium Management on a Kentucky Bluegrass Fairway. University of Nebraska, 1997.

% ETp	Weight Change † (g)	Injury‡ 6/10/97	Injury 6/17/97
40	-0.28	4.6	2.9a
60	-0.08	2.9	1.4b
80	-0.164	2.5	1.0b
LSD (0.05)	**ns**	**ns**	**1.0**

† Difference in verdure dry weight between trafficked and untrafficked turf.
‡ Turf injury based upon a scale of 1 to 9, with 1 equal to least damage and 9 equal to strawed turf.

1997 Preemergence Herbicide Evaluations

R.E. Gaussoin and M.R. Vaitkus

Research was conducted in 1997 to evaluate 14 preemergent herbicide treatments for annual grass control in Kentucky Bluegrass. The research site was a three year old blend of Kentucky bluegrass located at the John Seaton Anderson Turfgrass and Ornamental research Facility near Mead, NE.

The experimental area was maintained at a 2.5 in. mowing height and irrigation was applied as needed to prevent stress. The soil type was a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll), with 3.4% organic matter, a bulk density of 1.38 g/cm^3, and a pH of 6.8. Plot size was 3 feet by 6 feet. The experimental design was a randomized complete block with 3 replications comprised of 14 herbicide treatments, a fertilizer treatment, and an untreated control.

Treatments were applied on May 1, 1997. Weather during application was sunny, 52ºF, 54%RH, with a moderate (11 mph) SE wind; soil temperature was 46ºF. Split application treatments were applied June 24, 1997 on a partly sunny day. Air temperature during application was 78ºF, with 81%RH and a 14 mph wind from the SW; soil temperature was 74ºF. On both dates, liquid treatments were applied with a CO_2-driven backpack sprayer equipped with a single 8002VS flat fan nozzle and calibrated to deliver 40 gal/A at 30 psi. Granular applications were applied by hand. All treatments were watered-in following application.

No turf injury was observed in any of the treatments. Crabgrass germinated in early August and weed control evaluations were made on August 6, 13, and 20. Annual grass density was estimated visually on a scale from 0 to 100, with 100 equal to 100% annual grass cover. This data was then transformed to percent control information within each rep for each corresponding date.

During the first three evaluations, total annual grass pressure was low (17% density). To further stimulate germination, the turf was mown at 1.5 inches and weed control was evaluated a month later, Sept. 19. At this time, total weed pressure was about 50%. Annual grass composition in the experimental plots was approximately 50% crabgrass and 50% yellow foxtail.

Table 1. Annual Grass[1] Density and Control. Preemergence Herbicide Evaluation. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997

Treatment	Formulation	Rate lb ai/A	Annual Grass Density[2]				% Annual Grass Control			
			8/6	**8/13**	**8/20**	**9/16**	**8/6**	**8/13**	**8/20**	**9/16**
Untreated Control			18.3a[3]	15.0a	16.7a	48.3a	0.0c	0.0c	0.0c	0.0d
TEAM PRO/FERT	0.86 GR	1.5 split[4]	2.3b	1.0b	3.7c	5.0cd	80.3a	89.3a	79.0a	89.7ab
TEAM PRO/FERT	0.86 GR	2.0	1.0b	2.3b	3.7c	5.7cd	93.7a	80.7a	79.0a	88.7ab
TEAM/FERT	0.87 GR	1.5 split	2.3b	2.3b	2.0c	3.7cd	80.3a	80.7a	87.7a	92.7ab
TEAM/FERT	0.87 GR	2.0	1.0b	2.3b	2.3c	4.0cd	93.7a	80.7a	84.3a	92.0ab
PENDIMETHALIN/FERT	0.86 GR	1.5 split	2.0b	3.7b	3.7c	12.0bcd	91.7a	57.7ab	74.3a	74.7abc
PENDIMETHALIN/FERT	0.86 GR	2.0	1.0b	1.0b	2.3c	2.7cd	93.7a	89.3a	79.7a	94.3ab
DIMENSION/FERT	0.09 GR	0.38	1.0b	3.7b	2.3c	1.3d	93.7a	54.0ab	84.3a	97.3a
BARRICADE/FERT	0.22 GR	0.50	4.0b	4.0b	7.0bc	10.3bcd	63.7ab	69.3a	56.7ab	79.3ab
DIMENSION	1 EC	0.187 split	0.7b	3.7b	2.3c	5.7cd	97.0a	57.7ab	79.7a	88.7ab
DIMENSION	1 EC	0.25 split	3.7b	4.0b	2.3c	2.0cd	85.0a	62.7a	79.7a	95.7ab
DIMENSION/FERT	0.164 FG	0.25	3.7b	5.3b	3.7c	15.3bc	83.3a	54.0ab	71.0ab	67.3bc
DIMENSION/FERT	0.072 FG	0.125 split	2.3b	3.7b	3.7c	7.0cd	87.0a	75.7a	74.3a	85.3ab
BARRICADE	65 WG	0.65	0.7b	1.0b	2.3c	0.7d	95.3a	89.3a	84.3a	98.7a
PENDULUM	60 WG	1.5 split	1.0b	1.0b	2.3c	8.3cd	93.7a	89.3a	84.3a	83.0ab
Fertilizer Check	39 GR	65	11.7a	13.3a	11.7ab	23.7b	43.3b	17.7bc	35.7bc	49.7c
LSD (0.05)			**7.4**	**6.7**	**6.2**	**13.9**	**35.4**	**41.8**	**36.6**	**29.1**

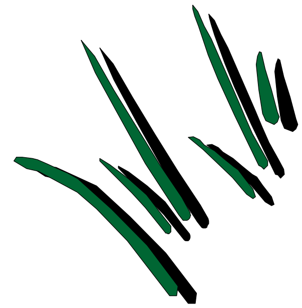
1. Annual grasses were comprised of approximately 50% crabgrass and 50% yellow foxtail.
2. Annual Grass Density estimated visually on a 0-100% scale, with 100 equal to 100% annual grass cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Table 2. Total Weed[1] Density and Control. Preeergence Herbicide Evaluation. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997

Treatment	Formulation	Rate lb ai/A	Total Weed Density[2]			% Total Weed Control		
			8/13	8/20	9/16	8/13	8/20	9/16
Untreated Control			18.7a[3]	23.3a	53.3a	0.0c	0.0e	0.0d
TEAM PRO/FERT	0.86 GR	1.5 split[4]	3.3b	7.3cd	9.3cd	61.0a	66.7abc	83.7ab
TEAM PRO/FERT	0.86 GR	2.0	6.0b	10.7cd	14.3cd	47.7ab	49.0bcd	75.0ab
TEAM/FERT	0.87 GR	1.5 split	5.7b	5.7cd	7.3cd	49.0ab	73.3abc	87.3ab
TEAM/FERT	0.87 GR	2.0	6.0b	9.0cd	11.0cd	47.7ab	60.0abc	80.0ab
PENDIMETHALIN/FERT	0.86 GR	1.5 split	7.3b	9.0cd	15.7cd	45.7ab	61.0abc	71.3ab
PENDIMETHALIN/FERT	0.86 GR	2.0	6.0b	6.0cd	12.3cd	50.0ab	68.3abc	77.7ab
DIMENSION/FERT	0.09 GR	0.38	4.7b	3.3d	2.0d	54.3a	85.3a	96.3a
BARRICADE/FERT	0.22 GR	0.50	9.3b	12.3bc	20.3bc	49.0ab	46.7cd	64.3bc
DIMENSION	1 EC	0.187 split	4.7b	3.3d	9.3cd	56.7a	81.7ab	82.7ab
DIMENSION	1 EC	0.25 split	7.7b	7.7cd	10.3cd	56.7a	57.3a-d	80.7ab
DIMENSION/FERT	0.164 FG	0.25	6.3b	6.0cd	17.7bcd	54.3a	71.0abc	69.0ab
DIMENSION/FERT	0.072 FG	0.125 split	4.7b	4.7cd	8.0cd	72.3a	77.3abc	85.0ab
BARRICADE	65 WG	0.65	6.0b	6.0cd	10.7cd	50.0ab	71.0abc	81.3ab
PENDULUM	60 WG	1.5 split	2.0b	4.7cd	10.7cd	83.3a	76.3abc	80.7ab
Fertilizer Check	39 GR	65	21.7a	20.0ab	32.0b	8.3bc	25.7de	40.7c
LSD (0.05)			**8.9**	**8.8**	**15.7**	**42.4**	**34.3**	**28.2**

1. Total Weeds were comprised of medic, dandelion and ground ivy, in addition to annual grasses.
2. Total Weed Density estimated visually on a scale of 1 to 100, with 100 equal to 100% total weed cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.
4. Two applications at indicated rate.

1997 Postemergence Herbicide Trial



R.E.Gaussoin and M.R. Vaitkus

Research was conducted in 1997 to evaluate 6 herbicide treatments for pre- and post-emergence control of annual grasses in Kentucky Bluegrass. The research site was a three year old blend of Kentucky bluegrass located at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE.

The experimental area was maintained at a 2.5 in. mowing height and irrigation was applied as needed to prevent stress. Soil type was a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil had 3.4% organic matter, a bulk density of 1.38 g/cm^3, and a pH of 6.8. Plots were 3 by 6 feet. The experimental design was a randomized complete block with 3 replications comprised of 6 herbicide treatments and an untreated control. The preemergence treatment was applied on May 1, 1997. Weather during application was sunny, 52ºF, 54%RH, with a moderate (11 mph) SE wind; soil temperature was 46ºF. The 2-4 leaf treatments were applied July 15. Weather was sunny, 83ºF, 55%RH, with a moderate (10 mph) SW wind; soil temperature was 77ºF. Weather during the 1-3 tiller treatments (July 24) was sunny, 89ºF, 63%RH, with a slight (7 mph) SW breeze; soil temperature was 82ºF. Liquid treatments were applied with a CO_2-driven backpack sprayer equipped with a single 8002VS flat fan nozzle and calibrated to deliver 40 gal/A at 30 psi. Granular applications were applied by hand. All treatments were watered-in following application.

Crabgrass germinated in mid July and weed control evaluations were made on August 6, 13, 20, and September 4. Annual grass density an total weed was estimated visually on a scale from 0 to 100, with 100 equal to 100% annual grass cover. This data was then transformed to percent control information within each rep for each corresponding date.

Annual grasses were comprised of approximately 60% yellow foxtail and 40% crabgrass and total weed pressure was only moderate (15-20%). To further stimulate germination, the turf was mown at 1.5 inches and weed control was evaluated a month later, Sept. 19. Data were analyzed using Pesticide Research Manager (PRM) software. When appropriate, means were separated using the Least Significant Difference (LSD) multiple comparison technique. Means and statistical results are summarized in the following tables.

At no time during the study did any applied treatment exhibit phytotoxicity. Annual grass density was greater in treated than in untreated plots for all observations on and after August 13. Annual grass control was always significancy greater in treated than in the untreated plots. Total weed (dandelion, black medic, and the annual grasses) density and control showed similar results. Some product differences were observed during the September 4 observations.

Table 1. Annual Grass[1] Density and Control. Preemergent Herbicide Evaluation. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997

Treatment	Formulation	Rate lb ai/A	Growth Stage	Annual Grass Density[2]					Annual Grass Control				
				8/6	**8/13**	**8/20**	**9/4**	**9/16**	**8/6**	**8/13**	**8/20**	**9/4**	**9/16**
Preclaim	3.09 EC	1.55	2-4 leaf	0.7a[3]	0.3b	4.0b	2.3b	5.3b	95.0a	97.7a	63.0a	88.0ab	88.7a
Preclaim	3.09 EC	2.06	2-4 leaf	0.3a	0.0b	1.0b	3.7b	15.3b	98.3a	100.0a	93.0a	82.7ab	68.3a
Preclaim	3.09 EC	2.06	1-3 tiller	0.3a	0.3b	1.0b	2.0b	1.0b	98.3a	98.7a	93.0a	90.3ab	98.0a
Acclaim Extra	0.57 EW	0.06	2-4 leaf	17.3a	10.0ab	1.0b	3.7b	18.7b	61.7a	66.7a	93.0a	82.0ab	59.7a
Pendulum	60 WG	2.0	Preemerg.	1.0a	0.3b	0.7b	0.7b	4.0b	93.3a	97.7a	96.3a	97.0a	92.0a
Dimension	1 EC	0.5	2-4 leaf	3.7a	3.7ab	4.0b	5.0b	20.0b	81.7a	65.3a	63.0a	74.0b	57.0a
Untreated Control				16.7a	15.0a	16.7a	20.0a	48.3a	0.0b	0.0b	0.0b	0.0c	0.0b
LSD (0.05)				**18.9**	**14.6**	**7.5**	**4.8**	**20.0**	**39.3**	**50.7**	**46.7**	**19.3**	**42.8**

1. Annual grasses were comprised of approximately 40% crabgrass and 60% yellow foxtail.
2. Annual Grass Density was estimated visually on a scale of 0 to 100, with 100 equal to 100% annual grass cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Table 2. Total Weed[1] Density and Control. Preemergent Herbicide Evaluation. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997

Treatment	Formulation	Rate lb ai/A	Growth Stage	Total Weed Density[2]				Total Weed Control			
				8/13	**8/20**	**9/4**	**9/16**	**8/13**	**8/20**	**9/4**	**9/16**
Preclaim	3.09 EC	1.545	2-4 leaf	4.0a[3]	12.3b	6.0b	15.3b	63.3a	46.3a	77.3ab	72.0a
Preclaim	3.09 EC	2.06	2-4 leaf	2.3a	6.3b	7.3b	24.0b	69.7a	66.3a	73.0ab	54.7a
Preclaim	3.09 EC	2.06	1-3 tiller	3.7a	4.7b	4.3b	11.3b	63.0a	86.0a	83.0ab	80.0a
Acclaim Extra	0.57 EW	0.06	2-4 leaf	13.7a	8.0b	7.3b	28.7b	57.3a	56.3a	71.0b	51.7a
Pendulum	60 WG	2.0	Preemerg.	2.7a	4.3b	2.7b	8.0b	85.3a	79.7a	89.7a	85.0a
Dimension	1 EC	0.5	2-4 leaf	5.7a	7.7b	7.3b	27.0b	64.0a	56.3a	72.0ab	51.3a
Untreated Control				18.7a	23.3a	26.7a	55.3a	0.0b	0.0b	0.0c	0.0b
LSD (0.05)				**16.6**	**9.9**	**5.5**	**23.0**	**41.8**	**42.0**	**18.4**	**39.9**

1. Total weeds were comprised primarily of dandelion and medic, along with the annual grasses.
2. Total Weed Density was estimated visually on a scale of 0-100% and 100 equal to 100% total weed cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Comparison of Microencapsulated Formulations to Pendulum WDG for Weed Control in Established Turfgrass

R.E. Gaussoin and M.R. Vaitkus

Research was conducted in 1997 to compare the efficacy of microencapsulated Pendimethalin to Pendulum WDG in Kentucky Bluegrass for weed control. The research site was a three year old blend of Kentucky bluegrass located at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE.

The experimental area was maintained at a 2.5 in. mowing height and irrigation was applied as needed to prevent stress. Prior to treatment, research area soils were sampled and analyzed. Soil is a silty clay loam (18.6% sand, 21.7% course silt, 25.8% fine silt, 4.1% very fine silt, 29.8% clay), with a pH of 7.2, 2,18% organic matter, and a CEC of 25.9.

Plot size was 3 feet by 6 feet with a running check of 2 feet between reps. The experimental design was a randomized complete block with 3 replications comprised of 9 herbicide treatments and an untreated control.

Treatments were applied on May 1, 1997. Weather during application was sunny, 52ºF, 54%RH, with a moderate (11 mph) SE wind; soil temperature was 46ºF. Treatments were applied with a CO_2-driven backpack sprayer equipped with a single 8002VS flat fan nozzle and calibrated to deliver 40 gal/A at 30 psi. All treatments were watered-in following application with a 0.05 inch irrigation.

During mixing and spraying, none of the microencapsulated treatments showed any differences from Pendulum WDG in terms of separation, dispersion, sprayability (there was no clogging of nozzles), residues or staining. All the formulations were also similar to Pendulum WDG in terms of cleanup.

No turf injury was observed in any of the treatments following application. Crabgrass germinated in mid July and weed control evaluations were made on August 6, 13, and 20 (14, 15, and 16 weeks after treatment (WAT), respectively.) Annual grass density was estimated visually on a scale from 0 to 100, with 100 equal to 100% annual grass cover. This data was then transformed to percent control information within each rep for each corresponding date.

During these evaluations, total annual grass pressure was low (averaging 10% density); total weed pressure during this time was approximately 20%. Annual grasses were comprised of approximately 15% crabgrass and 85% yellow foxtail, while black medic, yellow clover, and dandelion comprised most of the other weeds.

On September 2, a 3-foot band was sprayed with Finale in the center of each plot. One week later, half of this band was overseeded to perennial ryegrass (5 Iron Blend at 3#/1000ft^2) and half overseeded to Kentucky Bluegrass (Midnight at 2#/1000ft^2). Germination observations were made 14 days (Sept. 23) and 30 days (Oct. 9) after seeding. Germination was evaluated on a scale of 1 to 9, with one equal to 0-10% germination and 9= 90-100%. Data were analyzed using Pesticide Research Manager (PRM) software. When appropriate, means were separated using the Least Significant Difference (LSD) multiple comparison technique. Means and statistical results are summarized in the following tables.

Annual grass density was lower in the treated than in the untreated plots during all observations (Table 1). Annual grass control was also greater for treated than untreated plots. Of the treated plots, Pendulum 2G showed less control than all the other treatments.

Pendulum WDG at the 3.0 lb ai/A rate and AC 166, 225 at the 3.0 lb ai/A rate had the lowest total weed densities of all the treatments on both observation days (Table 2). Weed control was greater than the untreated control for Pendulum WDG at both rates, and AC 166, 223, 224, and 25 at the 3.0 lb ai/A rate.
Perennial ryegrass germination averaged approximately 70 to 75% and was not affected by treatment (Table 3). Kentucky bluegrass showed no germination on Sept. 23 (14 DAT) and only very low germination on October 9 (30 DAT). Treatments did not differ from the control or each other, but germination rates were still too low (0-10%) to be able to discern any differences between plots.

Table 1. Annual Grass[1] Density and Control. Comparison of Microencapsulated Formulations to Pendulum WDG for Weed Control in Established Turfgrass. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

Treatment	Formulation	Rate lb ai/A	Annual Grass Density[2]			% Annual Grass Control		
			8/6	8/13	8/20	8/6	8/13	8/20
Untreated Control			18.3a[3]	10.0a	8.3a	0.0c	0.0c	0.0c
Pendulum WDG	60 WG	1.5	0.7b	1.0b	1.0b	95.7a	85.0a	84.3a
Pendulum WDG	60 WG	3.0	0.0b	1.0b	1.0b	100.0a	85.0a	84.3a
AC 166, 223	3.3 CS	1.5	0.0b	1.0b	1.0b	100.0a	85.0a	84.3a
AC 166, 224	3.3 CS	1.5	0.3b	1.0b	1.0b	99.0a	85.0a	84.3a
AC 166, 225	3.3 CS	1.5	0.3b	1.0b	2.3b	96.7a	85.0a	57.7ab
AC 166, 223	3.3 CS	3.0	0.0b	1.0b	1.0b	100.0a	85.0a	84.3a
AC 166, 224	3.3 CS	3.0	.03b	1.0b	1.0b	99.0a	85.0a	84.3a
AC 166, 225	3.3 CS	3.0	0.0b	1.0b	1.0b	100.0a	85.0a	84.3a
Pendulum 2G	2.0 GR	1.5	5.3b	3.7b	3.7b	7.03b	51.7b	49.0b
LSD (0.05)			**7.9**	**4.8**	**3.6**	**11.8**	**23.2**	**32.1**

1. Annual grasses were comprised of approximately 15% crabgrass and 85% yellow foxtail.
2. Annual Grass Density estimated visually on a 0-100% scale, with 100 equal to 100% annual grass cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Table 2. Total Weed[1] Density and Control. Comparison of Microencapsulated Formulations to Pendulum WDG for Weed Control in Established Turfgrass. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

Treatment	Formulation	Rate lb ai/A	Total Weed Density[2]		% Total Weed Control	
			8/13	**8/20**	**8/13**	**8/20**
Untreated Control			23.3ab[3]	18.3ab	0.0c	0.0c
Pendulum WDG	60 WG	1.5	16.0abc	13.3abc	52.7ab	52.7ab
Pendulum WDG	60 WG	3.0	4.3c	3.3c	76.0a	76.0a
AC 166, 223	3.3 CS	1.5	9.3bc	3.3c	46.0abc	46.0abc
AC 166, 224	3.3 CS	1.5	11.0abc	7.7abc	31.7abc	31.7abc
AC 166, 225	3.3 CS	1.5	9.3bc	6.0bc	35.0abc	35.0abc
AC 166, 223	3.3 CS	3.0	6.3c	6.0bc	66.0ab	66.0ab
AC 166, 224	3.3 CS	3.0	5.0c	6.3abc	75.0a	75.0a
AC 166, 225	3.3 CS	3.0	6.0c	4.7c	49.3ab	49.3ab
Pendulum 2G	2.0 GR	1.5	25.3a	18.7a	26.7bc	26.7bc
LSD (0.05)			**15.3**	**12.5**	**46.3**	**46.3**

1. Total Weeds were comprised of black medic, white clover, and dandelion, in addition to annual grasses.
2. Total Weed Density estimated visually on a scale of 1 to 100, with 100 equal to 100% total weed cover.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

Table 3. Germination. Comparison of Microencapsulated Formulations to Pendulum WDG for Weed Control in Established Turfgrass. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

Treatment	Formulation	Rate lb ai/A	Germination[1]			
			Ryegrass 9/23	Kentucky bluegrass 9/23	Ryegrass 10/9	Kentucky bluegrass 10/9
Untreated			8.0a[2]	1.0a	7.0a	1.0b
Pendulum WDG	60 WG	1.52	7.3a	1.0a	7.7a	1.0b
Pendulum WDG	60 WG	3.0	7.7a	1.0a	7.0a	1.0b
AC 166, 223	3.3 CS	1.5	7.0a	1.0a	7.0a	1.0b
AC 166, 224	3.3 CS	1.5	7.7a	1.0a	737a	1.0b
AC 166, 225	3.3 CS	1.5	8.0a	1.0a	7.3a	1.0b
AC 166, 223	3.3 CS	3.0	6.7a	1.0a	7.0a	1.3a
AC 166, 224	3.3 CS	3.0	8.0a	1.0a	7.7a	1.0b
AC 166, 225	3.3 CS	3.0	6.3a	1.0a	6.7a	1.0b
Pendulum 2G	2.0 GR	1.5	8.7a	1.0a	7.0a	1.0b
LSD (0.05)			2.4	0.0	2.0	0.3

1. Germination was estimated visually on a scale of 1 to 9, with 1 equal to 0-10% and 9 equal to 90-100%
2. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique

Finale Nonselective Herbicide Evaluation

R.E. Gaussoin and M.R. Vaitkus

Research was conducted in 1997 to evaluate the speed of activity and straight line capabilities of Finale herbicide on northern turfgrasses. This trial was performed on a three year old blend of Kentucky bluegrass located at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE. The experimental area was maintained at a 2.5 in. mowing height and irrigation was applied as needed to prevent stress. Soil type was a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil had 3.4% organic matter, a bulk density of 1.38 g/cm^3, and a pH of 6.8. Plots were 3 by 6 feet. The experimental design was a randomized complete block comprised of 5 herbicide treatments and an untreated control with 3 replications.

Treatments were applied 14 days and 3 days (July 2 and 14, respectively) prior to the 1997 Turfgrass Field Day and Equipment Show (July 16, 1997). Weather during the July 2 application was sunny, 68ºF, 52%RH, with a moderate (15 mph) NW wind; soil temperature was 71ºF. During the second application on July 14, the weather was sunny, air temperature was 83ºF, with 45%RH and a 7 mph wind from the NW; soil temperature was 79ºF. On both dates, liquid treatments were applied with a CO_2-driven backpack sprayer equipped with a single 8002VS flat fan nozzle and calibrated to deliver 40 gal/A of product at 30 psi.

Data were collected July 17, July 30, August 26, and September 19 and analyzed using PRM (Pesticide Research Manager) software. Turfgrass injury was visually evaluated on a scale of 1 to 9, with 1 equal to no injury and 9 equal to strawed turf. Weed density was estimated visually on a scale from 0 to 100, with 100 equal to 100% weed cover. The density data was then transformed to percent control information within each rep for each corresponding date.

Turf injury and weed control were higher in the treated plots than in the untreated control from July 17 (3 and 14 days after treatment) up through the last observations, 11 weeks after treatment. Turf injury from Finale + Round-Up Pro applied on July 2 was lower than for the other treatments on most of the observation dates. Weed control was greater in treated plots than in the untreated control during all the observations, with Finale + Round-Up Pro applied on July 2 showing less control than the other treatments on July 30 and less control than all but Finale applied July 2 on August 26. Weeds invading plots where the grass had been totally removed by the treatments were dandelion, annual grasses, and ground ivy. Ground ivy was the dominant weed species in the untreated control plots and plots where grass had not been totally killed by the treatments.

Table 1. Turf Injury[1] and Weed Control[2] following application of Nonselective Herbicides. John Seaton Anderson Turfgrass and Ornamental Research Facility, Mead, NE. University of Nebraska. 1997

Treatment	Formulation	Rate oz/gal	Date[3]	Turf Injury 7/17	Turf Injury 7/30	Turf Injury 8/26	Turf Injury 9/16	Weed Control 7/17	Weed Control 7/30	Weed Control 8/26	Weed Control 9/16
Untreated				1.0c[4]	1.0c	1.0c	1.0c	0.0c	0.0c	0.0e	0.0c
FINALE 1SC	120 SC	3	7/2	9.0a	8.3a	8.3a	6.0b	100.0a	93.3a	48.3cd	4.0c
FINALE 1SC	120 SC	3	7/14	5.7b	9.0a	9.0a	9.0a	56.7b	100.0a	76.3ab	29.7b
Round-Up Pro	480 EC	2.6	7/2	9.0a	9.0a	9.0a	9.0a	100.0a	100.0a	72.3bc	34.7ab
Round-Up Pro	480 EC	2.6	7/14	6.0b	9.0a	9.0a	9.0a	50.0b	100.0a	100.0a	53.7a
Finale +Round-Up Pro	120 SC+ 480 EC	1.5 + 1.3	7/2	9.0a	6.7b	6.0b	4.7b	100.0a	80.0b	36.0d	27.3b
Finale + Round-Up Pro	120 SC+ 480 EC	1.5 + 1.3	7/14	5.3b	8.7a	8.3a	7.3ab	50.0b	100.0a	75.0b	31.7b
LSD (p=0.05)				**2.4**	**0.7**	**1.2**	**2.7**	**20.5**	**7.8**	**24.1**	**19.6**

1. Turf injury evaluated on a scale of 1 to 9, with a 9 indicating 100% injury.
2. Weed Control evaluated on a scale of 1 to 9, with 1 equal to no control and 9 equal to 90-100% control.
3. Treatment date.
4. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique.

MON 37500 Evaluation

R.E. Gaussoin and M.R. Vaitkus

Research was conducted to evaluate the safety of an experimental herbicide, MON 37500, to four cool season and one warm season turfgrass, along with postemergence broadleaf weed control performance. Three rates of the herbicide were applied to mature stands of Kentucky bluegrass, perennial ryegrass, tall fescue, creeping bentgrass, and buffalograss at the University of Nebraska's John Seaton Anderson Turfgrass Research Facility near Mead, Nebraska. Perennial ryegrass and creeping bentgrass plots were maintained at • ”; Kentucky bluegrass and tall fescue were maintained at 1.5" mowing height. Irrigation was applied as needed to prevent moisture stress. Buffalograss was maintained at a height of 2.5" with precipitation providing the only source of moisture. In all grass varieties, plot size was three feet by six feet, arranged in a completely randomized experimental design with three replications. Treatments were applied May 21, 1997. Weather was sunny, approximately 61ºF, 47% RH, with a 17 mph wind from the NW. Soil temperature at four inches was 47ºF. A CO_2-pressurized (30 psi) backpack sprayer, calibrated to deliver 20 gallons of spray solution per acre, was used to apply the treatments.

Turfgrass injury observations, rated on a scale from 1 to 9, with 9 indicating greatest injury, were made weekly over the next six weeks and biweekly for five more weeks after that. Data were analyzed using Pesticide Research Manager (PRM) software and are presented by species. When appropriate, means were separated using the Least Significant Difference (LSD) multiple comparison technique. Means and statistical results are summarized in the following tables.

The Kentucky bluegrass stand was a mixture of Merit, Baron, Touchdown, and Adelphi varieties. During the study, the area had a heavy (70 to 80% in control) pressure of broadleaf weeds, primarily ground ivy, white clover, and dandelion. Kentucky bluegrass treatment effects were first observed on June 3, 1997, approximately two weeks after treatment (WAT) (Table 1). Ground ivy showed evident discoloration and wilting, especially at the highest MON 37500 rate. At four WAT, all the treatments were showing significantly greater weed control than the untreated check. Weed control at the two higher rates of MON 37500 peaked at 4 to 6 WAT. The lowest rate of MON 37500 and Trimec Classic showed some initial weed control at 3 and 4 WAT, but were not significantly different from the control after that. No turf injury was visible until four WAT after treatment, when significantly greater turf injury than the control was observed at the two higher rates of MON 37500. A moderate level of injury (25-30%) was observed for up to 9 WAT at the highest rate of MON 37500, but was no longer significantly different from the control at 11 WAT.

Treatment effects in Perennial ryegrass (5-iron blend) were first observed on May 29, 1997, one WAT (Table 2). Faint to very obvious outlines (at higher MON 37500 rates) of the treatment plots were visible. Maximum turf injury appeared to peak at 5 WAT, but continued to be evident, especially at the higher rates of Mon 37500, up to 11 WAT. No treatment effects were observed for the lowest rate of MON 37500 or Trimec Classic.

Turf injury to Tall Fescue (Rebel II) became evident three WAT. All three rates of MON

37500 showed significant turf injury for eight WAT. At ten and eleven WAT turf injured at the lowest rate of MON 37500 had shown some recovery and only the two higher rates of MON 37500 still had significantly higher turf injury. No significant turf injury by Trimec classic was observed during this study.

A slight (20-30%) amount of turf injury to Creeping Bentgrass (Providence variety) was observed at three and four WAT (Table 4). At five WAT, no differences among the treatments were observed. No treatment effects were observed in Buffalograss (Texoca variety) turf.

Table 1. Turf Injury[1] and Quality[2] following application of MON 37500 and Trimec to Kentucky Bluegrass. Treated 5-21-97. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

			Turf Injury				**Weed Control**							
			Date (WAT)				**Date (WAT)**							
Treatment	**Formu-lation**	**Rate lb a.i./**	**6-17 (4)**	**6-24 (5)**	**7-1 (6)**	**8-6 (11)**	**6-3 (2)**	**6-11 (3)**	**6-17 (4)**	**6-24 (5)**	**7-1 (6)**	**7-18 (8)**	**7-30 (10)**	**8-6 (11)**
Untreated	---------	---------	1.0c[3]	1.0b	1.0b	1.0a	1.0b	1.0c	1.0b	1.0b	1.0b	1.0b	1.0a	1.0b
MON 37500	WG	0.03	2.0bc	1.3b	1.0b	1.0a	1.0b	1.0c	4.7a	3.3ab	2.0b	1.7ab	1.3a	1.3ab
MON 37500	WG	0.06	3.0ab	2.7a	2.3ab	1.3a	1.7ab	1.3c	6.7a	5.7a	6.3a	3.7a	2.0a	2.0ab
MON 37500	WG	0.125	3.3a	2.7a	2.7a	1.7a	2.0a	2.0b	6.3a	6.0a	6.7a	3.0ab	1.7a	2.7a
Trimec Classic	EC	0.75	1.3c	1.0b	1.0b	1.0a	1.7ab	3.0a	6.0a	4.3ab	4.7ab	1.0b	1.0a	1.7ab
LSD (p=0.05)	----------	----------	1.3	1.2	1.6	0.8	0.7	0.5	2.6	3.6	3.9	2.1	1.4	1.6

1. Turf Injury evaluated on a scale of 1 to 9, with 9 indicating 100% injury.
2. Weed control evaluated on a scale of 1 to 9, with 1 indicating 0 to 10% weed control and 9 indicating 100% weed control.
3. Means followed by the same letter do not significantly differ, based on the Least Significant Difference (LSD) comparison of multiple means..

Table 2. Turf Injury following application of MON 37500 and Trimec to Perennial Ryegrass. Treated 5-21-97. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

			Turf Injury[1]								
			Date (WAT)								
Treatment	**Formu-lation**	**Rate lb a.i./A**	**5-29 (1)**	**6-3 (2)**	**6-11 (3)**	**6-17 (4)**	**6-24 (5)**	**7-1 (6)**	**7-18 (8)**	**7-30 (10)**	**8-6 (11)**
Untreated	----------	----------	1.0b	1.0b	1.0b	1.3b	1.0b	1.0c	1.0b	1.0c	1.3b
MON 37500	WG	0.03	1.3b	1.0b	1.0b	1.7b	1.3b	1.3c	1.3b	1.0c	1.3b
MON 37500	WG	0.06	2.7a	2.0a	4.3a	4.7a	4.7a	3.3b	3.3b	3.3b	4.7a
MON 37500	WG	0.125	2.3a	2.3a	5.7a	6.0a	7.0a	5.7a	6.0a	5.7a	5.3a
Trimec Classic	EC	0.75	1.0b	1.0b	1.0b	1.0b	1.0b	1.0c	1.0b	1.0c	1.0b
LSD (p=0.05)	----------	----------	0.7	0.9	1.9	2.0	2.5	1.8	2.6	1.9	2.5

1. Turf Injury evaluated on a scale of 1 to 9, with 9 indicating 100% injury.
2. Means followed by the same letter do not significantly differ, based on the Least Significant Difference (LSD) comparison of multiple means.

Table 3. Turf Injury following application of MON 37500 and Trimec to Tall Fescue. Treated 5-21-97. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

			Turf Injury						
			Date (WAT)						
Treatment	**Formu-lation**	**Rate lb a.i./A**	**6-11 (3)**	**6-17 (4)**	**6-24 (5)**	**7-1 (6)**	**7-18 (8)**	**7-30 (10)**	**8-6 (11)**
Untreated	----------	----------	1.0b	1.0c	1.0c	1.0c	1.0c	1.0c	1.0c
MON 37500	WG	0.03	4.7a	7.3b	7.0b	6.3b	3.3b	2.0c	2.0c
MON 37500	WG	0.06	5.0a	8.0a	7.7a	8.7a	7.0a	4.3b	6.0b
MON 37500	WG	0.125	5.0a	8.0a	8.0a	9.0a	8.3a	7.3a	7.7a
Trimec Classic	EC	0.75	1.0b	1.0c	1.0c	1.0c	1.0c	1.0c	1.0c
LSD (p=0.05)	----------	----------	0.5	0.5	0.5	0.6	2.1	1.5	1.4

1. Turf Injury evaluated on a scale of 1 to 9, with 9 indicating 100% injury.
2. Means followed by the same letter do not significantly differ, based on the Least Significant Difference (LSD) comparison of multiple

Table 4. Turf Injury following application of MON 37500 and Trimec to Creeping Bentgrass. Treated 5-21-97. John Seaton Anderson Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

			Turf Injury [1] Date (WAT)	
Treatment	**Formulation**	**Rate lb a.i./A**	**6-11 (3)**	**6-17 (4)**
Untreated	----------	----------	1.0b	1.0b
MON 37500	WG	0.03	2.3a	1.0b
MON 37500	WG	0.06	2.3a	1.0b
MON 37500	WG	0.125	3.0a	1.7a
Trimec Classic	EC	0.75	1.0b	1.0b
LSD (p=0.05)	----------	----------	0.7	0.5

1. Turf Injury evaluated on a scale of 1 to 9, with 9 indicating 100% injury.
2. Means followed by the same letter do not significantly differ, based on the Least Significant Difference (LSD) comparison of

The Effect of Dimension Herbicide on Turf Quality

R.E. Gaussoin and M.R. Vaitkus

Research was conducted in 1997 to evaluate the effects of Dimension on turfgrass quality. The research site was a two year old USGA-specification research green seeded to Penncross and Providence Creeping Bentgrass at the John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE. Treatments included two formulations of Dimension at three different application rates. 1997 was the first year of a three year study.

The experimental area was maintained at a 0.125 inch (1/8 inch) height, vertically mown and topdressed every two to three weeks. Plot size was 3 feet by 6 feet. The experimental design was a randomized complete block with 3 replications comprised of 7 herbicide treatments, a fertilizer treatment and an untreated control in each of the two varieties of creeping bentgrass.

Treatments were applied on May 12, June 25, and August 26. On May 12 weather was partly cloudy, with air temperature of 60ºF, 31% RH, and a SW breeze at 15 mph; soil temperature was 53ºF. Weather during the second application, on June 25, was sunny, 75ºF, 71% RH, and a slight NW breeze of 3 mph; soil temperature was 73ºF. August 26 was partly sunny, 80ºF, 67% RH, and a slight NW breeze of 4.5 mph; soil temperature was 76ºF. Liquid treatments were applied with a CO2-driven backpack sprayer equipped with a single 8002VS flat fan nozzle and calibrated to deliver 40 gal/A at 30 psi. Granular applications were applied by hand. All treatments were watered-in following application.

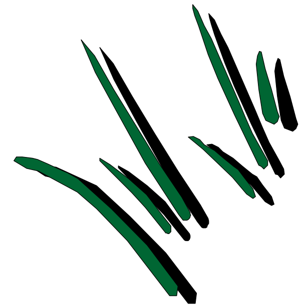
No turf injury was observed until mid June, when average weekly temperatures consistently remained in the 80s and 90s. Turf injury was visually evaluated June 25, August 20, September 9 and September 16. On September 16 turfgrass quality was also evaluated. Means and statistical results are summarized in the following table. On all observation dates turf injury for both bentgrass varieties was highest in the 1 EC formulation plots with two and three applications. A concurrent reduction in turf quality for these treatments was also observed.

Table 1. Turfgrass Injury[1] and Turfgrass Quality[2]. Dimension Herbicide Evaluation. 1997. John Seaton Anderson Turfgrass and Ornamental Research Facility near Mead, NE. University of Nebraska, 1997.

Bentgrass Variety	Treatment	Formulation	Rate lb ai/A	Number of Applications	Turf Injury				Quality
					6/25	8/20	9/4	9/16	9/16
Penncross	Untreated				1.3de[3]	1.0d	1.7cd	2.3bc	4.7def
Penncross	Dimension	1 EC	0.5	One	1.7cde	1.3d	1.0d	2.0bc	5.0cde
Penncross	Dimension	1 EC	0.5	Two	2.0bcd	3.3bc	2.0bcd	2.0bc	5.3bcd
Penncross	Dimension	1 EC	0.5	Three	2.7ab	4.0ab	5.0a	5.3a	2.7g
Penncross	Dimension	0.25 FG	0.5	One	2.0bcd	1.3d	1.3d	2.0bc	5.0cde
Penncross	Dimension	0.25 FG	0.5	Two	2.0bcd	3.3bc	2.3bcd	2.0bc	5.0cde
Penncross	Dimension	0.25 FG	0.5	Three	2.0bcd	2.0cd	1.3d	3.0b	4.7def
Penncross	Fertilizer Check	39 GR	65	One	1.3de	1.0d	1.7cd	1.7c	5.3bcd
Providence	Untreated				1.3de	1.0d	1.0d	1.7c	6.3a
Providence	Dimension	1 EC	0.5	One	2.3abc	1.3d	1.0d	1.3c	6.3a
Providence	Dimension	1 EC	0.5	Two	2.0bcd	3.7b	2.3bcd	2.0bc	5.7abc
Providence	Dimension	1 EC	0.5	Three	2.3abc	4.0ab	3.7abc	4.7a	4.0f
Providence	Dimension	0.25 FG	0.5	One	2.7ab	3.0bc	2.0bcd	1.7c	6.0ab
Providence	Dimension	0.25 FG	0.5	Two	3.0a	5.3a	4.0ab	2.3bc	5.7abc
Providence	Dimension	0.25 FG	0.5	Three	2.3abc	4.3ab	4.7a	4.7a	4.3ef
Providence	Fertilizer Check	39 GR	65	One	1.0e	1.3d	2.0bcd	1.7c	6.0ab
LSD (0.05)					**0.8**	**1.4**	**2.0**	**1.2**	**1.0**

1. Turfgrass injury evaluated on a scale of 1 to 9, with 1 equal to no injury and 9 equal to strawed turf.
2. Turfgrass quality evaluated on a scale of 1 to 9, with 1 equal to the poorest quality turf and 9 equal to the highest quality turf.
3. Means within columns followed by different letters are significantly different based on the Least Significant Difference (LSD) multiple means technique

A Systems Approach to Dollar Spot Management on Bentgrass



J.E. Watkins, R.E. Gaussoin
and R.C. Shearman

Continuous use of fungicides has fostered an increasing incidence of field tolerance by some turfgrass pathogens to certain groups of systemic products. For dollar spot, caused by *Sclerotinia homeocarpa*, fungicides are a primary method of disease control. To lessen the potential for induced fungicide resistance and the potential for ground water pollution, cultural practices and fungicide treatments should be integrated into a total disease management system. Unfortunately, this approach is not a common practice among turfgrass managers and golf course superintendents. In this study we will provide the basis for a systems approach to the management of dollar spot on a creeping bentgrass turf.

Replicated plots were located on a Penncross creeping bentgrass turf. The turf was mowed daily at 0.32 cm, irrigated to 80% ETP and veriticut and top dressed with “G” sand on a 10- to 14-day schedule. The plot area was inoculated with *Sclerotinia homeocarpa* cultured on autoclaved tall fescue seed. The inoculum was applied monthly from June to August at a rate of 2 lb/1000 ft^2 using a drop spreader. The disease management component consisted of integrating fungicide treatments with nitrogen fertilization. A tank mix of Aliette Signature 80WP +Fore 75DG at 12.2 and 8 oz/1000 ft^2, respectively, was applied on a 14- to 28-day schedule beginning early June and terminating late August. Sulfur-coated urea was applied at rates of 1/8 lb N (3 lb N/1000 ft^2 /season) or 1/4 lb N (6 lb N/1000 ft^2/season) on a 7-day schedule beginning late April and terminating early October. The sulfur-coated urea treatments were applied in either an integrated systems program with the fungicide treatments or by themselves. Data were collected three times during the growing season; mid-August, early September and early October.

The 6 lb rate showed significantly lower disease injury than the 3 lb rate; however, at the higher N rate, turf quality was low in August and September and moderate in October. Turf quality in August and September was low because of scalping injury caused by the high N rate on those plots. The 3 lb rate without fungicide treatment produced unacceptable turf because of high disease injury and poor turf quality. When the two nitrogen fertilizer treatments were supplemented with the Aliette Signature 80WP + Fore 75DG fungicide treatments, turf quality improved and disease injury was lessened. By October the lowest disease level and highest turf quality were produced by the 6 lb rate supplemented by fungicide applications on a 28-day schedule. This treatment was more effective than the 3 lb rate supplemented with fungicides applied every 14 days.

These data show that by integrating higher nitrogen fertilization rates with fewer fungicide applications, turf quality can be maintained without sacrificing dollar spot control. Assuming the average size of a bentgrass golf green is 456 square meters, increasing the seasonal nitrogen fertilization rate from 3 lb/100 ft^2 to 6 lb/1000 ft^2 and reducing the number of fungicide treatments from 7 to 4 could result in a reduction of fungicide use by approximately 200 lb on an 18-hole golf course, while still maintaining acceptable turf quality and low disease injury. This reduction presents significantly less risk to the environment and to potential surface and ground water contamination. It provides for cost effective disease control and also provides the basis for developing a more sustainable integrated disease/turf management program for creeping bentgrass greens.

Table 1. Dollar Spot and Turf Quality Ratings for a Disease Management System for a Bentgrass Green.

Treatments[1] and rate/1000 ft[2]	Application frequency	August 21		September 5		October 2	
		Dollar spot[2] severity	**Turf quality[2]**	**Dollar spot[2] severity**	**Turf quality[2]**	**Dollar spot[2] severity**	**Turf quality[2]**
Aliette Signature 80WP, 4 oz + Fore 75DG, 8 oz	14	1.0	2.0	1.25	2.75	4.0	5.25
Sulfur-coated urea (32-0-0), 1/8 lb N	7						
Aliette Signature 80WP, 4 oz + Fore 75DG, 8 oz	28	1.25	6.5	1.25	6.5	2.0	3.0
Sulfur-coated urea (32-0-0), 1/4 lb N	7						
Sulfur-coated urea (32-0-0), 1/4 lb N	7	1.5	7.5	2.5	7.5	3.5	4.75
Sulfur-coated urea (32-0-0), 1/8 lb N	7	6.5	6.0	8.0	7.75	8.25	8.75
Mean		**2.6**	**5.5**	**3.25**	**6.1**	**4.4**	**5.4**
LSD (#0.05)		**0.85**	**0.65**	**0.75**	**1.9**	**1.25**	**1.1**
Correlation Coefficient (r) for turf quality and disease severity			**-0.20**		**-0.57**		**-0.97**

1. Fertilizer treatments were initiated 24 April and terminated 2 October. Fungicide treatments were initiated 5 June and terminated 28 August.
2. Dollar spot severity was rated on a scale of 1-10 with 1 being the lowest severity and 10 the highest severity. Turf quality was rated on a scale of 1-9 with 1 being the highest quality and 9 being the lowest.

Bipolaris Leaf Spot Biocontrol with a Bacterial Agent in Tall Fescue, 1997

G. Y. Yuen, Z. Zhang, and L. J. Giesler

Stenotrophomonas maltophilia strain C3, a chitinolytic strain isolated from Kentucky bluegrass foliage, was evaluated in two experiments. The experiments were conducted in established tall fescue turf at the University of Nebraska John Seaton Anderson Turfgrass Research Facility near Mead, NE. The first experiment was located in 'Kentucky 31', the second in 'Wrangler'. Both plantings were maintained under low fertility (around 50 kg N/ha annually), twice-weekly irrigation, and at 8 cm height. Urea (50 kg/ha) was applied to the experiment areas about 2 wk before each experiment. There were four 1.5 m x 1.5 m replicate plots per treatment arranged in a randomized complete block design. Nontreated plots were the controls. In the first experiment, 250 ml of a C3 cell suspension (7 X 10E8 CFU/ml in phosphate buffer amended with 0.25% Soydex) was applied to plots on 2 Jun and a second application was made 18 days later. All plots were inoculated on 9 Jun with 250 ml of a *B. sorokiniana* conidial suspension containing 5 X 10E5 spores/ml in the buffer solution. The plots were sprinkler-irrigated shortly after inoculation. Because there were drying winds and humidity was low, the experiment area was covered with Seed Guard tarp for 2 days to maintain high canopy moisture. In the second experiment, C3 was tested at 10E7 and 10E9 CFU/ml, with 500 ml of suspension being applied to each plot. In addition, C3 at 10E7 CFU/ml in combination with 0.4% (w/v) colloidal chitin was tested. The treatments were applied on 2 Sep and 9 Sep. Pathogen inoculum (500 ml/plot) was sprayed on 5 Sep. The experiment was irrigated just prior to inoculation, and ambient humidity was sufficient for infection. Foliage was sampled 11 and 7 days after pathogen inoculation in experiment 1 and 2, respectively, and again 1 wk later. Three subsamples of over 10 leaves each were collected from each plot and then pooled. Total numbers of lesions and total leaf length were measured in each sample and used in calculating infection frequency (numbers of lesions per 100 cm leaf). In addition, the percent diseased leaf area in each sample was estimated.

Infection frequencies in both experiments were high. Lesions did not expand appreciably in size, however, and so the percent diseased leaf area was low at the end of both experiments. When disease severity (percent diseased turf area) was gauged across entire plots, treatment effects could not be discerned. All treatments with strain C3 reduced infection frequency and diseased leaf area compared to the controls. In the second experiment, the highest degree of control was provided by the high cell density treatment. The addition of chitin enhanced the efficacy of the low cell density treatment.

Expt. Treatment	Lesions per 100 cm leaf[1]	Percent diseased leaf area[2]
1 Nontreated control	190	8.5
C3 at 7 x 10E8 CFU/ml	67	3.9
LSD (0.05)	**37**	**2.0**
2Nontreated control	171	6.0
C3 at 10E7 CFU/ml	115	3.9
C3 at 10E7 CFU/ml + chitin	79	2.9
C3 at 10E9 CFU/ml	51	2.1
LSD (0.05)	**24**	**0.8**

1. Values are means of two sampling dates.
2. Measurements were made 17 and 14 days after pathogen inoculation in experiment 1 and 2, respectively.

Buffalograss Insect Pest Research

T.M. Heng-Moss and F.P. Baxendale

Recently, two grass-feeding mealybugs were identified as potentially serious pests of buffalograss in Nebraska. An effective biological control program of these pests requires detailed information on the biology, life history, and population dynamics of the beneficial arthropod community, yet little information was available on the beneficial arthropods associated with buffalograss. The objectives of this research were to identify the beneficial arthropods associated with buffalograss, and to investigate these beneficial arthropods as potential biological control agents for *T. sporoboli* and *Trionymus* sp.

Part 1:

The first objective of this research was to document the beneficial arthropod complex in buffalograss, monitor the seasonal abundance of selected beneficial arthropods, and investigate the influence of different management levels on the composition and abundance of natural enemies associated with buffalograss. This was done by collecting and identifying arthropods using pitfall traps and sod plug samples from selected buffalograss sites. Beneficial arthropods were also surveyed from buffalograss stands maintained at high and low management levels to determine the impact of management practices on the composition and abundance of resident natural enemies.

- Beneficial arthropods found inhabiting buffalograss in Nebraska included ants, spiders, ground beetles, rove beetles, big-eyed bugs, and several species of hymenopterous parasitoids.
- Pitfall traps are a more effective sampling technique than sod plugs for capturing highly mobile, surface dwelling arthropods.
- Total numbers of beneficial arthropods collected from sites maintained at the high and low management regimes were not significantly different, suggesting that beneficial arthropods can be conserved over a fairly wide range of buffalograss maintenance levels.

Part 2:

For objective two we identified hymenopterous parasitoids associated with buffalograss, identified the parasitoids of *T. sporoboli* and *Trionymus* sp., and evaluated the effectiveness of these parasitoids as biological control agents for buffalograss mealybugs.

- In the rearing study, 48.6% (170/350) of the adult female mealybugs were parasitized by *Rhopus nigroclavatus*. A dissection study documented parasitism of both immature and adult female mealybugs.
- These results demonstrated *R. nigroclavatus* have clear preference for adult female mealybugs and later instar nymphs, and suggested that *R. nigroclavatus* can have an important regulating effect on mealybug populations in the greenhouse.
- Significant differences were detected in numbers of non-parasitized mealybugs between treatments containing only mealybugs and treatments containing both mealybugs and parasitoids.
- This study demonstrated the effectiveness of *R. nigroclavatus* as a biological control agent for buffalograss mealybugs under greenhouse conditions.

The successful control of buffalograss mealybugs depends on the development of alternative pest management strategies since insecticidal control has proven largely unsuccessful under both field and greenhouse conditions. Biological control may offer the most effective approach available for reducing mealybug populations. The development of a biological control program will be challenging, but it is important for establishment of a comprehensive integrated pest management program for the insects and mites affecting buffalograss.

Effect of Post-Treatment Irrigation on Control of Buffalograss Chinch Bugs with Deltamethrin, 1997

T.M. Heng-Moss, F.P. Baxendale, T.P.Riordan
and A.P. Weinhold

Insecticides were evaluated for control of chinch bugs on a buffalograss seed production field near Murdock, NE. The turf (100% buffalograss) was maintained un-mowed but was cut to a height of 2 inches prior to insecticide applications. Thatch accumulation (finger compressed) in the plot area was less than 0.125 inches. Field conditions at the study site were: soil type, silty clay loam; soil organic matter, 3-5%; soil pH, 6-7; water pH, 7.0. Environmental conditions at the time of treatment were as follows: soil moisture 11%; air temperature 80ºF; soil temperature 79ºF; relative humidity 73%; wind direction and velocity 126E at 6 mph. Plots were 6 x 10 ft and the experimental design was a RCB with 4 replications. Insecticide treatments were applied on 27 Aug 1997. Granular treatments were applied by using a pre-calibrated 24H12 Gandy spreader. Liquid insecticides were applied using a CO_2 sprayer with a TeeJet® 8002 nozzle at 30 psi and delivering 87 gpa finished spray. Post-treatment irrigation was implemented by applying 0.5 or 0.125 inches of water to designated plots using a sprinkling can. A total of 1.53 inches of rain fell during the post treatment period. Treatments were evaluated 3, 7, and 21 DAT (30 Aug, 4, and 18 Sep) by removing from each plot three, 4.25 inch diam turf-soil cores (0.3 ft^2 total area) to a depth of 1 inch. Cores were placed in Berlese funnels and extracted chinch bugs were counted after 48 hr. Pre-treatment estimate of insect activity was 30+ chinch bugs per ft^2.

Dursban Pro 2EC provided statistically significant reductions in chinch bug numbers at all evaluation dates except the non-irrigated treatment at 3 DAT. At 7 DAT, all Deltamethrin treatments, except the 50SC formulation with no irrigation, provided statistically significant chinch bug control. Deltamethrin 50SC consistently showed a numerical reduction in control which corresponded to reductions in post-application irrigation. No phytotoxicity was observed.

Treatment/ formulation	Irr. inch/ft^2	Rate lb a.i/A	Mean CB/0.3 ft^2 3 DAT	7 DAT	21 DAT	% Control 3 DAT	7 DAT	21 DAT
Deltamethrin 50SC	0.5	0.05	4.25a	10.75ab	12.25acb	73.4	67.2	55.5
Dursban Pro 2EC	0.5	0.05	5.75a	5.00a	0.50a	64.1	84.7	98.2
Dursban Pro 2EC	0.0	0.10	10.75ab	2.50a	0.75ab	32.8	92.4	97.3
Deltamethrin 50SC	0.125	1.00	12.25ab	12.50ab	16.25bc	23.4	62.8	40.9
Deltamethrin 0.1G	0.125	0.05	13.75ab	10.50ab	6.25ab	14.1	67.9	77.3
Untreated Check	---	---	16.00ab	32.75c	27.50c	----	----	----
Deltamethrin 50SC	0.0	0.05	19.75b	20.75bc	23.75c	0.0	36.6	13.6

Means in a column followed by the same letter are not significantly different (D= 0.05 LSD).

Fungicide Efficacy in the Control of Brown Patch on Perennial Ryegrass

J.E. Watkins and L.A. Wit

Plots were located on a blend of perennial ryegrasses at the John Seaton Anderson Turf and Ornamental Research Facility at the University of Nebraska Agricultural Research and Development Center near Mead, NE. Plots were mowed three times weekly at a height of 0.62 in and maintained at 80% ETp. Preemergence weed control was with Tupersan at 8 lb/acre applied 7 May 97. Urea (46-0-0) was applied 26 Jun 97 at 1 lb N/1000 sq ft. The experimental area was inoculated in late Jun and again in late Jul with *Rhizoctonia solani* cultured on sterilized tall fescue seed. After inoculation the area was covered with Seed Guard (A.M. Leonard, Inc., Piqua, OH) for 48 hr to encourage disease development. Seed Guard is a white spun-bound polypropylene material used in turfgrass establishment to increase seed germination. Fungicide treatments were applied using a CO_2 pressurized (25 psi) backpack sprayer with a flat fan nozzle to 25 sq ft plots. The sprayer was calibrated to deliver 5 gal spray solution per 1000 sq ft. Four replications per treatment were arranged in a randomized complete block design. Precipitation was below normal Apr through Sep, and temperatures were above normal Jun through Sep with intermittent cool periods in Jul and Aug.

Disease severity was moderate and reached its peak the third week of Jul. By the time the last fungicide treatments were applied on 21 Aug, brown patch was not active on the plots. Both Heritage 50WG treatments, Lynx 25DF + Daconil 2787 4F, Bayleton 25DF + Daconil 2787 4F, and Bayleton 25DF + Heritage 50WG held disease injury to less than 20%. Heritage 50WG applied on a 28-day schedule was as effective as when applied every 14 days. Turf quality was moderate to moderately high for all treatments except CGA-BMP 46.5WP applied every 7 days. The CGA-BMP treatments caused moderate stunting and bronzing of the turf.

Treatment and rate (F)/1000 ft^2	Treatment interval (days)[1]	Brown patch injury (24 Jul)[2]	Turf quality (8 Aug)[2]
Eagle 40W, 1.2 oz	21	4.0	2.8
Eagle 40W, 1.2 oz alt w/Heritage 50WG, 0.25 oz	21	3.0	2.3
Eagle 40W, 1.2 oz alt w/Prostar 50WP, 2 oz	21	2.0	2.5
Heritage 50WG, 0.3 oz	14	0.5	2.5
Heritage 50WG, 0.3 oz	28	1.0	3.3
Lynx 25DF, 0.5 oz + Daconil 2787 4F, 3 fl oz	14	1.8	3.3
Bayleton 25DF, 0.5 oz + Daconil 2787 4F, 3 fl oz	14	1.5	4.0
Bayleton 25DF, 0.5 oz + Heritage 50WG, 0.2 oz	21	1.3	3.0
Bayleton 25DF, 1 oz	28	3.3	3.8
CGA-BMP 46.5WP, 0.5 oz	7	2.0	6.3
CGA-BMP 46.5WP, 0.5 oz	14	2.5	5.0
CGA-BMP 46.5WP, 1 oz	14	2.5	3.8
Sentinel 40WG, 0.25 oz	21	2.8	4.3
Aliette Signature 80WG, 4 oz	14	5.0	2.8
Aliette 80WG, 4 oz	14	5.5	3.0
Chipco 26019 FLO 2SC, 4 fl oz	14	4.5	2.8
Cinnacure 5% EC, 0.1% a.i.	7	4.3	2.8
Cinnacure 5% EC, 0.5% a.i.	7	4.8	3.5
Cinnacure 5% EC, 1.0% a.i.	7	4.8	3.0
Untreated check	-	5.8	4.5
Means		**3.1**	**3.4**
LSD ($P \leq 0.05$)		**0.9**	**1.2**

1. Treatments were initiated 10 Jul, and the final treatments applied 21 Aug.
2. Disease injury is rated on a scale of 0-10 as an estimate of the percent of the plot area showing symptoms. A 1 rating would be approximately 10% of the plot showing disease injury symptoms; a 5 approximately 50% injury and a 10 approximately 100% injury. Turf quality rated on a scale of 1 being best, 5 intermediate and 9 worst. Ratings are the means of four replications.

Chemical Control of Dollar Spot on Perennial Ryegrass

J.E. Watkins and L.A. Wit

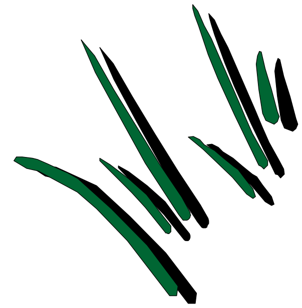
Plots were located on a blend of perennial ryegrasses at the John Seaton Anderson Turf and Ornamental Research Facility at the University of Nebraska Agricultural Research and Development Center near Mead, NE. The experimental area was inoculated in early Jun with *Sclerotinia homoeocarpa* cultured on sterilized tall fescue seed. The inoculum was applied with a 4-ft wide Gandy drop spreader calibrated to deliver 3 lb tall fescue inoculum per 1000 sq ft. Plots were mowed three times per week at a height of 0.62 in and maintained at 80% ETp. Eight lb/acre of Tupersan were applied for preemergence weed control along with 1 lb P/1000 sq ft on 7 May 97. Fungicide treatments were applied using a CO_2 pressurized (25 psi) backpack sprayer with a flat fan nozzle to 25 sq ft plots. The sprayer was calibrated to deliver 5 gal spray solution per 1000 sq ft. Three replications per treatment were arranged in a randomized complete block design. Precipitation was below normal Apr through Sep, and temperatures were above normal Jun through Sep with intermittent cool periods in Jul and Aug.

Dollar spot developed rapidly from late Jul to early Sep. Bayleton 25DF, 0.5 oz + Daconil 2787, 3 fl oz applied on a 14-day schedule was the most effective treatment. Chipco 26019 provided a moderate level of control with no significant differences occurring between the 2-, 3-, or 4-fl oz rates. EXP 10790A 2SC applied every 14 days at 4 fl oz showed significantly less dollar spot than at the 2- or 3-fl oz rates. A similar trend was noted for EXP 10702B. Daconil Ultrex, 3.8 oz; Eagle 40W, 0.6 oz; and Bayleton 25DF, 0.5 oz applied every 14 days were more effective than Banner MAXX applied on a 21-day schedule. None of the treatments were phytotoxic.

Treatment and rate (F)/1000 ft²	Treatment interval (days[1])	Dollar spot injury[2]	
		31 Jul	21 Aug
Eagle 40W, 0.6 oz	21	1.3	3.0
Eagle 40W, 0.6 oz alt w/Fore 75DG, 6 oz	14	1.0	2.3
Lynx 25DF, 0.5 oz + Daconil 2787 4F, 3 fl oz	14	1.0	1.7
Bayleton 25DF, 0.5 oz + Daconil 2787 4F, 3 fl oz	14	1.0	1.0
Bayleton 25DF, 0.5 oz + Heritage 50 WG, 0.2 oz	14	1.0	1.7
Bayleton 25 DF, 0.5 oz	14	1.0	1.3
Chipco 26019 FLO 2SC, 2 fl oz	14	1.3	4.3
Chipco 26019 FLO 2SC, 3 fl oz	14	1.0	3.7
Chipco 26019 FLO 2SC, 4 fl oz	14	1.0	3.7
EXP10790A 2SC, 2 fl oz	14	1.0	5.0
EXP10790A 2SC, 3 fl oz	14	1.7	4.7
EXP10790A 2SC, 4 fl oz	14	1.0	3.0
EXP10702B 2SC, 2 fl oz	14	1.3	4.7
EXP10702B 2SC, 3 fl oz	14	2.0	3.3
EXP10702B 2SC, 4 fl oz	14	1.3	2.3
EXP80318A 1.67SC, 0.5 fl oz	14	1.3	2.3
EXP80318A 1.67SC, 1 fl oz	14	2.3	2.0
Daconil Ultrex 82.5WG, 3.8 oz	14	1.7	2.7
Banner MAXX 14.3%, 1 fl oz	21	1.3	5.7
Cinnacure 5% EC, 0.1% a.i.	7	2.0	5.7
Cinnacure 5% EC, 0.5% a.i.	7	3.0	7.3
Cinnacure 5% EC, 1.0% a.i.	7	3.3	7.7
Untreated Check	-	4.0	8.0
Means		1.7	4.1
LSD ($P \leq 0.05$)		0.7	1.6

1. Treatments were initiated 10 Jul, and the final treatments applied 21 Aug.
2. Disease injury is rated on a scale of 0-10 as an estimate of the percent of the plot area showing symptoms. A 1 rating would be approximately 10% of the plot showing disease injury symptoms; a 5 approximately 50% injury and a 10 approximately 100% injury. Ratings are the means of three replications.

Fungicides Evaluated for Control of Pythium Blight on Perennial Ryegrass



J.E. Watkins and L.A. Wit

Five fungicide treatments were applied to plots of a perennial ryegrass blend located at the John Seaton Anderson Turf and Ornamental Research Facility at the University of Nebraska Research and Development Center near Mead, NE. The experimental area was inoculated mid-Jul with *P. aphanidermatum* cultured on sterilized tall fescue seed and applied with a 4-ft wide Gandy drop spreader calibrated to deliver 3 lb tall fescue inoculum per 1000 sq ft. After inoculation the plot area was covered with Seed Guard (A.M. Leonard, Inc., Piqua, OH) for 48 hr to encourage disease development. Seed Guard is a white spun-bound polypropylene material used in turfgrass establishment to increase seed germination. Fungicide applications were initiated 10 Jul and repeated 31 Jul and 21 Aug. Products were applied with a CO_2-pressurized (25 psi) backpack sprayer with a flat fan nozzle at a delivery rate of 5 gal spray solution per 1000 sq ft. Twenty-five sq ft plots were replicated four times in a randomized complete block design. Plots were mowed three times per week at a height of 0.62 in and maintained at 80% ETp. Eight lb/acre of Tupersan were applied for preemergence weed control along with 1 lb P/1000 sq ft on 7 May. Urea (46-0-0) was applied 26 Jun at 1 lb N/1000 sq ft. Precipitation was below normal Apr through Sep, and temperatures were above normal Jun through Sep with intermittent cool periods in Jul and Aug.

Pythium blight was moderately severe during the latter half of Jul but was not active during Aug. Although the initial treatments of 10 Jul were applied prior to inoculation and the onset of symptoms, Banol 6EC, 2 fl oz + ICIA 5504 50WG, 0.2 oz and Heritage 50WG, 0.4 oz were the only effective treatments. All other treatments did not differ significantly from the untreated check plot.

Treatment and rate (F)/1000 ft^2	Pythium blight injury† (22 Jul)
Banol 6EC, 1.3 fl oz	5.3
Banol 6EC, 2 fl oz	5.8
Heritage 50WG, 0.4 oz	2.0
Banol 6EC, 2 fl oz + ICIA 5504 50WG, 0.2 oz	1.5
BO 66752 61%, 3.8 oz	5.5
Untreated check	6.0
Means	4.3
LSD ($P \leq 0.05$)	1.4

† Disease injury is rated on a scale of 0-10 as an estimate of the percent of the plot area showing symptoms. A 1 rating would be approximately 10% of the plot showing disease injury symptoms, a 5 approximately 50% injury, and a 10 approximately 100% injury. Ratings are the means of four replications.

Influence of Application Timing on Insecticides for Control of Southern Masked Chafer, 1997

T.M. Heng-Moss, F.P. Baxendale, T.P.Riordan and A.P. Weinhold

This study was conducted in Lincoln, NE on a golf course rough. The turf (50% Kentucky bluegrass and 50% perennial rye) was maintained at a mowing height of 2.0 inches. Thatch accumulation (finger compressed) in the plot area was 0.75 inches. Field conditions at the study site were: soil type, silty clay loam; soil organic matter, 3.5%; soil pH, 6.5; water pH, 7.0. Environmental conditions at the time of application, (17 Jun, and 12 Aug) were as follows: soil moisture 20%, and 22% by wt respectively; air temperature 84ºF, and 64ºF; soil temperature 65ºF, and 66ºF; relative humidity 32%, and 88%; wind direction and velocity 245º at 3 mph., and 345º at 7 mph. Plots were 6 x 10 ft and the experimental design was a RCB with 4 replications. Liquid insecticides were applied using a CO_2 sprayer with a TeeJet® 8002 nozzle at 30 psi and delivering 87 gpa. Following applications, plots were irrigated with 0.25 inches of water. Post-treatment precipitation totaled 8.34 inches. Treatments were evaluated 80 days after the first application on 05 Sep by removing from each plot six, 8-inch diam turf-soil cores (2.10 ft^2 total area) to a depth of 3 inches and counting the number of surviving grubs.

The June applications of both formulations of Mach 2 and the numbered compounds A167C044 and A167C045, and A167C044 and Mach 2 1.5G applied in August provided statistically significant reductions of southern masked chafers when compared to the untreated control. Except for A167C044 and Mach 2 1.5G at the 1.0lb rate, all products applied in August failed to provide significant reductions of white grub numbers. No phytotoxicity was observed.

Treatment/ formulation	Rate lb a.i./acre	Appl. Date	Mean grubs/ 2.10 ft^2		% Control
Mach 2 1.5G	1.0	Jun	0.00	a	100.0
Mach 2 2.5G	1.0	Jun	0.00	a	100.0
A167C044 0.86G	1.5	Jun	0.00	a	100.0
A167C045 0.57G	1.0	Jun	0.25	a	98.9
A167C044 0.86G	1.5	Aug	2.50	a	88.9
Mach 2 1.5G	1.0	Aug	6.25	ab	72.2
Merit 75W	0.3	Jun	8.00	abc	64.4
Merit 75W	0.3	Aug	9.25	abc	58.9
Fertilizer check	1.0	Jun	10.25	abc	54.4
A167C045 0.57G	1.0	Aug	10.50	abc	53.3
Mach 2 2.5G	1.0	Aug	17.50	bc	22.2
Fertilizer check	1.0	Aug	18.50	bc	17.8
UTC	---	---	22.25	c	----

Means in a column followed by the same letter are not significantly different (p = 0.05; LSD).

Selected Rates of Coventional and Biorational Insecticides for Early Season Sod Webworm Control, 1997

A.P. Weinhold, F.P. Baxendale
J. Schild, and T. Merrigan

Insecticides were evaluated for control of sod webworm larvae on a Kentucky bluegrass lawn at the Gering Cemetery, in Scotts Bluff County, Nebraska. The turf (80% Kentucky bluegrass, 20% perennial rye and tall fescue) was maintained at a mowing height of 2.5 inches. Thatch accumulation (finger compressed) in the plot area was 0.5 inches. Field conditions at the study site were: soil type, silt loam; soil organic matter, 2.3%; soil pH, 8.4. Weather conditions at the time of application were as follows: soil moisture 22% by wt; air temperature 71ºF; soil temperature 70ºF; relative humidity 27%; wind direction and velocity 108º at 7 mph. Plots were 6 x 10 ft and the experimental design was a RCB with 4 replications. Treatments were applied on 5 May 1997. Liquid insecticides were applied using a CO_2 sprayer with a TeeJet® 8002 nozzle at 30 psi and delivering 87 gpa finished spray. Following applications, plots were irrigated with 0.25 inches of water. No rain fell during the post treatment period. Treatments were evaluated 3, 7, and 14 DAT (8, 12, and 19 May) by mixing 0.5 oz of Lemon Dawn® per gal of water and applying 2 gal of the dilution to each of two 6 ft sampling areas per plot (12.0 ft^2 total area). Larvae that had moved to the grass surface after 30 minutes were collected and counted.

At 3 DAT, the experimental products DE-105 4SC, Tempo 0.1 G (A) at the 0.1 and 0.135 rates, Tempo 0.1 G (B) at the 0.135 rate, and the standard Dursban Pro provided statistically significant reductions of sod webworms when compared to the untreated control. By 7 DAT all products except Conserve 1 SC at the 0.08 and 0.009 rates had provided statistically significant reductions. At 14 DAT, all products provided statistically significant sod webworm control, with Tempo (A) at the 0.1 rate and Dursban Pro giving 100% control, and the remaining products providing reductions of 75% or better. No phytotoxicity was observed.

Treatment/ Formulation		Rate lb a.i./acre	Mean SWW/12 ft^2 (3 DAT)	% Control	Mean SWW/12 ft^2 (7 DAT)	% Control	Mean SWW/12 ft^2 (14 DAT)	% Control
DE-105	4 SC	0.8	2.50a	87.2	1.25abc	84.4	2.00a	87.8
Tempo[1]	0.1 G	0.1	4.25ab	78.2	2.00a-d	75.0	0.00a	100.0
Tempo[1]	0.1 G	0.135	5.75abc	70.5	0.75ab	90.6	0.33a	98.0
Dursban Pro	2 EC	1.0	6.75a-d	65.4	0.25a	96.9	0.00a	100.0
Tempo[2]	0.1 G	0.135	9.00a-e	53.8	1.00ab	7.5	0.67a	95.9
Tempo[2]	0.1 G	0.1	10.75a-f	44.9	3.00a-d	62.5	4.00a	75.5
Conserve	1 SC	0.001	12.00a-f	38.5	1.00ab	87.5	1.33a	91.9
Conserve	1 SC	0.08	12.25a-f	37.2	6.50ef	18.8	4.00a	75.5
Talstar	10 W	0.1	14.00b-f	28.2	1.50abc	1.5	1.33a	91.9
Conserve	1 SC	0.003	14.50c-f	25.6	3.00a-d	62.5	3.00a	81.6
Merit	0.5 G	0.3	16.25def	16.7	4.50cde	43.8	4.00a	75.5
Conserve	1 SC	0.027	17.50ef	10.3	4.00b-e	50.0	1.00a	93.9
UTC	---	---	19.50f	---	8.00f	---	16.33b	---
Conserve	1 SC	0.009	20.50f	0.0	5.00def	37.5	2.33a	85.7

Means followed by the same letter are not significantly different (D = 0.05; LSD).
[1] = carrier batch number 7030131.
[2] = carrier batch number 7030132.

1994 National Perennial Ryegrass Trial

M. R. Vaitkus, R. C. Shearman,
J. E. Watkins and L. A. Wit

The National Perennial Ryegrass trial was planted in September, 1994 at a seeding rate of 5.0 lbs./1000 sq. ft. The trial contains 96 entries planted in a completely randomized block design with 3 replications. Plot size is 3 feet by 5 feet. A severe winter caused extensive winter kill and the entire trial was interseeded in May 1996.

Soil type is a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil chemistry analyses for the spring of 1997 showed a pH of 7.0, with 3.5% organic matter (Table 1).

Turf height is maintained at 5/8 inch, and is mowed four to five times weekly. Nitrogen and potassium are applied at 6.0 lbs. N and K/1000 sq. ft. per year; phosphorous is applied at 1.0 lb. P/1000 sq.ft./year. Irrigation is adjusted twice weekly to maintain an application rate of 80% ETp. Pendimethalin is applied annually at label-recommended rates for crabgrass control. Postemergence herbicides are applied only as needed. No fungicides or insecticides are applied. In 1997, weekly traffic treatments were initiated and took place from early April through October.

In 1997, spring greenup, genetic color, and leaf texture, as well as monthly turfgrass quality were evaluated (Table 2). In July, brown patch (*Rhizoctonia solani*) occurred and was also rated.

1997 EVALUATIONS

Overall cultivar performance in 1997 reflected the relatively mild spring and early-summer growing conditions (Table 2). Mean quality ratings ranged from 3.2 to 7.0, with only five cultivars having overall mean quality ratings that were lower than the acceptable fairway turfgrass quality rating level of 6.0. Cultivars demonstrated seasonal differences in turfgrass quality, as well as differences in genetic color,

Table 1. Soil analysis results. 1994 National Perennial Ryegrass Trial at the J.S. Anderson Turfgrass and Ornamental Research Facility near Mead, NE. University of Nebraska, 1997.

pH	K ppm	Bray P ppm	Organic Matter %	CL IC ppm	CEC cmol/kg	K Exch cmol/kg	Na Exch cmol/kg	Mg Exch cmol/kg	Ca Exch cmol/kg	S ppm
7.0	475.7	14.6	3.5	9.15	33.14	1.28	0.34	4.53	19.07	9.3

Table 1. 1994 NTEP Perennial Ryegrass Trial at the J.S. Anderson Turfgrass Research Facility near Mead, NE - 1997 Data. University of NE, 1997.

CULTIVAR	COLOR[1]	SPRING GREEN-UP[2]	TEXTURE[3]	DENSITY[4]			QUALITY[5]								BROWN PATCH[6]
	6/23	3/27	6/23	3/27	7/24	9/17	4/24	5/28	6/23	7/24	8/21	9/17	10/22	MEAN	7/23
MB 43	7.7	3.0	2.3	7.7	8.0	9.0	5.3	9.0	9.0	8.0	7.0	7.0	7.7	7.6	7.0
PST-2FF	8.0	3.3	2.7	8.0	8.0	8.7	6.0	9.0	9.0	7.7	7.0	6.7	7.3	7.5	5.3
MB 42	8.3	2.7	2.7	8.3	8.7	9.0	5.7	8.7	8.7	8.0	6.3	7.3	8.0	7.5	5.3
MB 44	9.0	2.3	2.7	8.0	9.0	8.7	5.0	8.7	8.3	8.7	7.0	7.0	7.7	7.5	4.0
LRF-94-MPRH	8.0	4.0	3.7	8.7	8.3	8.7	6.0	8.7	9.0	7.7	6.7	6.3	7.7	7.4	3.7
MB 1-5	8.3	4.0	2.0	8.0	8.3	9.0	6.0	8.7	8.7	7.7	6.0	7.3	7.7	7.4	6.0
MB 41	7.7	4.0	3.0	8.7	8.3	8.7	6.3	8.7	8.7	8.0	6.3	6.3	7.7	7.4	6.0
MB 45	8.7	3.7	2.7	7.7	8.3	8.3	5.0	8.7	8.7	8.0	7.0	6.3	8.0	7.4	5.3
Accent	7.0	4.0	2.3	9.0	8.3	8.3	6.0	8.3	9.0	7.7	7.0	6.3	7.3	7.4	5.3
Esquire	7.3	4.7	2.3	9.0	8.7	8.7	5.7	8.7	9.0	8.0	6.7	6.3	7.3	7.4	5.3
Elf	7.7	4.7	2.7	8.0	8.3	9.0	5.3	8.3	8.3	8.0	6.3	7.0	8.0	7.3	5.7
MB 47	7.7	3.7	2.7	8.3	8.3	9.0	5.7	8.0	8.3	7.7	7.0	7.0	7.7	7.3	6.3
KRF-94-C7	9.0	3.3	3.7	8.3	8.0	8.7	4.7	8.7	8.7	7.0	7.3	7.0	7.7	7.3	7.0
MB 46	8.3	3.0	2.3	7.7	8.3	8.7	5.3	8.7	8.7	7.7	5.7	7.3	7.7	7.3	6.3
RPBD	7.3	4.3	2.0	8.7	8.7	8.0	6.0	8.7	8.3	8.3	6.3	5.7	7.7	7.3	6.0
TopHat	7.0	4.0	3.0	8.0	8.3	8.7	6.0	7.7	8.7	7.7	6.7	6.7	7.3	7.2	4.7
ISI-MHB	7.0	3.8	2.0	8.5	8.5	8.5	6.3	7.8	8.5	7.8	6.5	6.5	7.3	7.2	6.7
Calypso	7.3	3.3	2.7	8.0	8.0	8.7	5.0	8.3	8.7	7.0	7.0	6.7	7.7	7.2	5.0
WVPB-93-KFK	6.7	4.0	3.7	8.3	8.7	8.3	6.0	8.3	8.3	7.0	7.0	6.7	7.0	7.2	6.3
Prizm	7.0	4.3	2.7	8.0	8.3	8.7	6.0	8.7	8.7	7.0	6.3	6.7	7.0	7.2	6.0
SRX 4400	6.3	4.0	3.0	9.0	9.0	8.7	5.7	8.3	9.0	8.0	6.3	6.3	6.7	7.2	6.3
Divine	7.3	3.3	2.7	8.0	7.3	8.3	5.3	8.3	8.7	6.3	7.3	6.3	8.0	7.2	5.7
Laredo	6.7	3.7	2.3	8.3	8.7	8.0	4.7	8.3	9.0	7.3	6.7	6.3	7.7	7.1	6.7
J-1706	7.3	4.3	2.3	8.7	8.3	8.7	6.0	8.3	8.0	7.7	6.3	6.3	7.3	7.1	6.7
WX3-93	7.3	3.3	2.3	8.0	8.7	8.3	4.7	8.7	8.7	8.0	6.7	6.0	7.3	7.1	6.3
PST-2R3	7.3	5.0	3.0	9.0	9.0	8.7	6.7	8.3	8.7	7.3	6.0	6.3	6.7	7.1	6.3
Imagine	8.7	2.3	3.7	7.3	8.7	8.7	4.3	8.3	8.3	8.0	6.3	7.0	7.7	7.1	5.7
Vivid	6.7	3.7	3.0	8.0	7.7	8.3	5.3	8.7	9.0	7.7	6.0	5.7	7.3	7.1	6.3
ZPS-2NV	7.7	3.0	2.7	8.0	8.0	8.3	5.7	8.7	8.7	7.7	6.7	6.0	6.3	7.1	5.7
Pick PR 84-91	7.0	3.7	3.0	8.3	7.7	8.7	6.0	8.3	8.7	7.0	6.0	6.3	7.3	7.1	6.3
ZPS-PR1	7.3	4.7	2.0	8.7	8.7	8.7	6.0	8.3	8.7	7.7	5.0	6.7	7.3	7.1	5.7
TMI-EXFLP94	7.0	3.7	3.0	8.0	8.0	8.7	5.7	8.0	8.3	7.3	7.0	6.3	7.0	7.1	6.3

Table 1. Cont.

CULTIVAR	COLOR[1]	SPRING GREEN-UP[2]	TEXTURE[3]	DENSITY[4]			QUALITY[5]								BROWN PATCH[6]
	6/23	3/27	6/23	3/27	7/24	9/17	4/24	5/28	6/23	7/24	8/21	9/17	10/22	MEAN	7/23
PST-GH-94	7.3	3.0	2.7	8.0	8.0	8.7	5.0	8.7	8.3	7.7	7.0	6.0	7.0	7.1	7.3
Manhattan III	7.3	3.3	3.0	8.7	8.7	8.3	5.0	8.0	8.3	8.0	6.7	6.3	7.3	7.1	5.7
APR 106	6.3	4.0	2.7	8.3	7.7	8.3	6.3	8.0	9.0	6.3	6.7	6.3	6.7	7.1	5.0
Med 5071	7.3	3.7	2.3	9.0	8.0	8.0	6.3	8.0	9.0	7.3	6.0	5.7	7.0	7.0	7.0
ZPS-2DR-94	7.7	4.0	2.3	8.0	8.3	9.0	5.0	8.0	9.0	8.0	6.0	6.7	6.7	7.0	7.3
Assure	7.0	4.0	3.3	8.7	8.3	8.3	6.0	8.0	8.7	7.3	6.3	6.0	7.0	7.0	5.3
Pick 928	6.3	4.3	3.0	8.0	8.3	8.3	5.7	8.0	8.3	7.3	6.3	6.7	6.7	7.0	5.3
Precision	7.0	3.7	2.7	8.0	8.0	8.3	6.0	8.0	8.0	7.3	6.3	6.3	7.0	7.0	5.0
Cutter	7.3	2.7	3.3	8.0	8.3	8.7	5.3	8.0	8.7	7.0	6.3	6.7	7.0	7.0	5.7
MVF-4-1	6.3	5.0	2.3	8.0	8.3	8.7	6.0	8.0	9.0	7.0	6.3	6.0	6.7	7.0	5.7
SRX 4010	7.0	3.7	2.3	7.7	8.3	8.3	6.0	8.0	8.0	7.7	6.3	6.3	6.7	7.0	6.0
SRX 4200	7.0	4.0	2.3	8.0	8.3	8.7	5.3	8.0	8.7	8.0	6.3	6.0	6.7	7.0	6.7
Pick Lp 102-92	8.0	2.3	3.7	8.7	8.7	8.3	5.3	8.0	8.7	7.7	6.3	6.0	7.0	7.0	6.3
Saturn	6.7	5.0	3.3	8.0	8.0	8.7	6.3	8.0	8.3	8.0	5.3	6.0	7.0	7.0	6.3
Nobility	6.7	4.3	4.0	8.7	8.3	8.0	6.0	8.0	8.3	8.0	6.3	5.7	6.7	7.0	6.3
PST-2DLM	8.0	2.7	3.0	7.0	8.0	8.3	4.3	8.7	8.0	7.0	7.3	6.3	7.0	7.0	6.0
BAR USA 94-II	8.0	5.0	2.7	8.3	8.7	8.7	5.3	8.7	8.7	7.3	5.0	6.3	7.0	6.9	6.0
DLP 1305	5.7	4.3	3.3	8.7	7.3	8.7	6.3	8.3	8.3	5.3	6.3	6.7	7.0	6.9	6.7
KOOS 93-6	6.7	3.7	2.7	8.7	8.0	8.7	5.0	8.0	8.0	7.7	6.3	6.0	7.3	6.9	5.7
Achiever	7.3	4.0	3.0	8.0	8.3	8.7	5.3	8.0	8.3	7.7	6.3	6.0	6.7	6.9	6.7
PS-D-9	6.3	4.3	3.3	8.0	8.3	8.7	5.3	7.7	8.7	7.7	6.3	5.7	7.0	6.9	6.3
PST-2FE	7.0	3.0	2.3	7.3	8.0	8.7	5.0	7.7	8.0	7.7	6.0	6.0	7.7	6.9	7.0
OMNI	6.7	4.3	3.0	8.3	7.7	8.7	5.3	8.7	8.3	6.7	5.7	6.3	7.0	6.9	5.7
ZPS-2ST	7.3	3.3	3.0	7.7	8.0	8.3	5.0	7.7	7.7	7.3	6.7	6.7	6.7	6.8	6.3
Riviera II	7.0	4.7	3.3	8.0	8.0	8.3	5.3	8.0	8.3	7.3	5.7	6.3	6.7	6.8	6.0

Table 1 cont.

CULTIVAR	COLOR[1]	SPRING GREEN-UP[2]	TEXTURE[3]	DENSITY[4]			QUALITY[5]								BROWN PATCH[6]
	6/23	3/27	6/23	3/27	7/24	9/17	4/24	5/28	6/23	7/24	8/21	9/17	10/22	MEAN	7/23
WVPB 92-4	6.0	4.3	3.0	8.3	8.0	8.0	5.7	8.0	8.3	7.3	6.3	5.3	6.7	6.8	6.0
BAR Er 5813	6.3	3.3	2.3	8.3	7.3	8.3	5.3	7.7	7.7	6.0	6.7	7.3	7.0	6.8	6.7
Edge	7.0	4.7	3.3	8.0	7.7	8.3	5.7	8.0	8.3	7.0	5.3	6.3	6.7	6.8	5.3
PSI-E-1	7.0	3.3	3.0	8.7	8.0	8.7	5.7	8.0	8.3	7.0	5.7	6.0	6.7	6.8	6.0
Morning Star	7.3	3.7	3.7	8.0	8.0	8.0	5.7	8.3	8.0	6.7	5.7	6.3	6.7	6.8	3.0
PST-2ET	8.3	3.3	3.0	8.0	7.7	8.0	5.7	7.3	7.7	7.7	6.0	5.7	7.3	6.8	5.7
Brightstar	7.0	3.0	3.0	8.0	7.7	8.3	4.7	8.3	8.0	7.0	5.3	6.3	7.7	6.8	6.7
APR 124	7.0	4.7	2.3	8.3	7.0	8.0	6.0	8.3	8.3	5.3	6.3	6.0	6.7	6.7	4.3
Williamsburg	6.0	3.7	3.3	8.0	8.3	8.0	5.7	7.7	8.0	7.0	6.3	5.7	6.3	6.7	5.3
ISI-R2	7.5	4.0	3.0	8.0	8.0	8.0	5.0	8.5	8.5	7.0	5.5	5.5	6.5	6.6	5.7
Dancer	6.0	4.3	2.3	7.7	7.7	8.0	5.7	8.0	8.3	6.0	6.0	6.3	6.7	6.7	5.0
LRF-94-C8	8.7	3.0	3.7	7.7	8.3	8.0	5.0	8.0	7.3	7.0	6.7	5.3	7.7	6.7	6.3
Stallion Select	6.7	3.7	3.7	8.3	8.3	8.0	6.0	7.7	8.0	7.7	5.7	6.0	6.0	6.7	5.3
WX3-91	6.7	3.7	3.7	8.0	7.7	7.7	5.3	8.0	7.7	6.7	5.7	5.7	7.7	6.7	5.7
PC-93-1	6.3	4.3	3.3	7.7	8.0	8.3	5.0	8.0	8.7	7.0	5.3	6.0	6.7	6.7	6.3
Advantage	7.7	3.0	3.3	7.7	8.0	8.7	4.3	8.0	8.3	7.3	5.7	6.0	7.0	6.7	5.0
J-1703	7.0	4.3	2.7	8.0	8.0	8.3	5.7	8.0	8.3	6.3	5.3	6.0	6.7	6.6	6.0
PST-2DGR	8.3	3.3	3.7	7.3	7.7	8.3	4.7	8.3	8.0	6.0	6.7	5.7	7.0	6.6	5.3
PST-2CB	7.3	4.3	3.7	8.3	6.7	8.3	5.3	8.0	8.0	7.3	5.0	5.7	7.0	6.6	7.0
WVPB-PR-C-2	6.0	4.0	2.7	8.3	8.0	8.3	6.3	8.0	8.0	6.0	6.0	5.7	6.3	6.6	6.7
Express	6.0	3.7	3.3	8.3	7.7	8.0	6.3	8.0	8.0	5.7	5.7	5.7	6.7	6.6	5.0

Table 1 cont.

CULTIVAR	COLOR[1]	SPRING GREEN-UP[2]	TEXTURE[3]	DENSITY[4]			QUALITY[5]								BROWN PATCH[6]
	6/23	3/27	6/23	3/27	7/24	9/17	4/24	5/28	6/23	7/24	8/21	9/17	10/22	MEAN	7/23
Navajo	7.0	3.7	3.3	8.3	7.7	8.3	4.7	8.0	8.3	7.0	5.7	5.7	6.3	6.5	7.3
LRF-94-B6	8.3	3.0	4.3	7.7	7.7	8.0	4.0	8.0	8.0	7.3	5.7	5.3	7.3	6.5	6.3
Nighthawk	7.0	3.7	4.0	7.3	8.0	7.7	4.3	7.7	8.0	7.0	6.3	5.3	7.0	6.5	4.7
KOOS 93-3	6.3	5.0	3.3	8.0	7.7	7.7	5.3	7.7	8.0	6.7	6.0	5.7	6.0	6.5	5.7
Pegasus	6.7	3.3	3.0	8.0	8.0	8.0	4.7	7.7	8.0	7.3	5.3	5.3	7.0	6.5	5.3
Quikstart	7.0	3.0	3.3	7.3	8.3	8.0	4.3	7.7	8.0	7.7	5.3	5.7	6.7	6.5	6.7
CAS-LP23	7.0	4.0	2.3	7.7	7.7	8.0	4.7	8.0	7.7	7.0	5.3	5.7	7.0	6.5	6.3
APR 066	6.0	4.3	3.0	8.0	7.7	7.7	5.3	8.0	8.3	6.7	5.3	5.3	6.0	6.4	5.7
PST-2M3	8.7	2.7	3.3	7.0	7.7	8.3	3.3	8.0	7.7	6.7	6.0	5.0	7.3	6.3	7.3
APR 131	6.0	3.0	3.3	7.3	7.7	8.0	5.0	7.7	8.0	6.0	5.3	5.7	6.3	6.3	6.0
Nine-O-One	8.3	2.3	3.3	7.0	7.7	7.7	4.3	7.3	7.0	7.3	6.0	5.3	6.3	6.2	5.3
Lesco-TWF	7.7	2.7	3.3	7.0	7.3	8.0	4.3	8.0	7.0	6.7	5.3	5.3	6.3	6.1	5.3
PST-28M	7.0	4.0	3.7	7.0	7.0	8.3	4.3	7.7	7.3	6.7	4.7	5.3	6.7	6.1	6.7
Figaro	5.0	5.3	4.7	8.0	6.0	7.7	5.3	7.7	7.3	4.7	5.3	5.0	5.3	5.8	6.0
Pennfine	5.7	3.7	4.3	8.3	7.3	7.3	5.7	7.3	6.7	5.7	4.3	4.0	6.0	5.7	7.0
DSV NA 9401	5.0	4.3	4.7	7.7	5.7	7.0	5.0	8.0	7.7	2.7	4.7	4.7	5.7	5.5	7.3
DSV NA 9402	5.0	4.0	3.7	7.7	5.3	7.0	5.0	7.3	7.3	3.0	4.3	4.0	5.7	5.2	7.0
Linn	4.3	2.0	8.7	5.7	4.3	5.0	2.3	5.7	3.7	2.3	2.0	2.3	4.0	3.2	6.0
MEAN	**7.1**	**3.7**	**3.1**	**8.0**	**8.0**	**8.3**	**5.4**	**8.1**	**8.2**	**7.1**	**6.1**	**6.0**	**7.0**	**6.8**	**5.9**
LSD (0.05)[7]	**0.8**	**1.3**	**1.1**	**1.0**	**1.1**	**0.9**	**1.4**	**0.8**	**0.9**	**1.6**	**1.4**	**1.2**	**0.9**	**0.6**	**1.6**

1. Color rating scale, 1-9, with 9=darkest.
2. Spring green-up scale 1-9, with 9=90-100% green.
3. Leaf texture rating scale 1-9, with 9=most desirable texture.
4. Turfgrass density 1-9 scale, 9=greatest density.
5. Turfgrass quality 1-9 scale, 9=highest quality.
6. Brownpatch rating 1-9 scale, 1= totally diseased, 9=no disease.
7. To determine statistical differences among cultivars, subtract one entry's mean from another entry's mean. Statistical differences occur when this value is larger than the corresponding LSD value.

1995 National Kentucky Bluegrass High and Low Maintenance Trials

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Medium/High Input Trial

The High Maintenance Kentucky Bluegrass trial was planted in late-September, 1995 at a seeding rate of 2 lbs./1000 sq. ft. The trial contains 103 entries planted in a completely randomized block design with 3 replications. Plot size is 3 feet by 8 feet. A severe winter following planting caused extensive winter kill and the entire trial was interseeded in April 1996.

Soil type is a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil chemical analyses for spring 1997 samples showed a pH of 7.2 and organic matter at 1.5%.

Turf height was maintained at three inches during the establishment year of 1996 and lowered to 5/8 inch in 1997. Turfs were mowed four to five times weekly for the duration of the trial. Nitrogen and potassium are applied at 4.0 lbs. N and 4.0 lbs. K/1000 sq. ft./ growing season. Phosphorous is applied at 1.0 lb. P/1000 sq. ft./ growing season. Irrigation is adjusted twice weekly to maintain an application rate of 80% ETp. Pendimethalin is applied annually at label-recommended rates, for crabgrass control. Postemergence herbicides are applied only as needed. No fungicides or insecticides are to be applied. In April weekly traffic treatments were initiated and continued through October.

In 1997, genetic color, spring green-up, leaf texture and seasonal stand density data, as well as monthly turfgrass quality data, were collected (Table 1). A sod tensile strength measurement was made in June, approximately 20 months after seeding.

pH	K ppm	Bray P ppm	% Organic Matter	CL IC ppm	CEC cmol/kg	K Exch cmol/kg	Na Exch cmol/kg	Mg Exch cmol/kg	Ca Exch cmol/kg	S ppm
7.2	504.3	24.73	1.46	11.40	33.69	1.28	0.33	5.30	15.47	6.73

Low Input Trial

The Low Maintenance Kentucky Bluegrass trial was planted in late-September, 1995 at a seeding rate of 2 lbs./1000 sq. ft. The trial contains 21 entries planted in a completely randomized block design with 3 replications. Plot size is 3 feet by 8 feet. Due to extensive winter kill and the entire trial was interseeded in April 1996.

Soil type is a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil chemical analysis in the spring of 1997 showed organic matter at 1.9% and a pH of 7.2.

Turf height is maintained at three inches and turfs are mowed once each week. Fertilization is limited to the application of nitrogen at 1.0 N lb./1000 sq. ft./growing season. Irrigation is adjusted twice weekly to maintain an application rate of 60% ETp. Pendimethalin is applied annually for crabgrass control, at label-recommended rates. Post-emergence herbicides were applied in the Fall of 1997 and will be applied again in Fall, 1999. No other post-emergence herbicide applications will be made; no fungicides or insecticides will be applied. In 1997, weekly traffic treatments were initiated in early April and lasted through October. These treatments will continue annually until the study is terminated in 2000. Genetic color, spring green-up, leaf texture and seasonal stand density data, as well as monthly turfgrass quality data, were collected in 1997 (Table 2).

pH	K ppm	Bray P ppm	Organic Matter %	CL IC ppm	CEC cmol/kg	K Exch cmol/kg	Na Exch cmol/kg	Mg Exch cmol/kg	Ca Exch cmol/kg	S ppm
7.2	465.0	21.74	1.9	13.15	34.15	1.18	0.36	5.61	16.76	4.6

1996 EVALUATIONS

Medium/High Input Trial

Cultivar performance in 1997 reflected the relatively mild Spring and early-Summer growing conditions (Table 1). Spring turfgrass densities were all above an acceptable rating of 6.0 and increased throughout the growing season. Mean turfgrass quality ranged from 4.9 to 7.5, with only 8 cultivars having overall mean quality ratings below 6.0 (a turfgrass quality rating of # 6.0 is considered unacceptable quality). Sod tensile strength at 20 months was also quite high. Eighty nine (89) cultivars had sod tensile strength values that exceeded 50 lbs (the acceptable level needed for adequate sod handling); seventy seven (77) cultivars showed sod strength greater than 70 lbs.

Low Input Trial

As with the Medium/High Input Trial, cultivar densities were high and reflected well-established plots. Only two cultivars had mean turfgrass quality ratings that were below the acceptable quality level (i.e. ≤ 6.0 (Table 2)).

Table 1. Data from the 1995 national Kentucky Bluegrass medium/high maintenance trial at the J.S. Anderson Turfgrass Research Facility near Mead, NE for 1997. University of Nebraska, 1997.

Cultivar	Color[1]	Spring Green-up[2]	Leaf Texture[3]	Density[4]			Quality[5]								Sod Strength[6]
	6/24	3/26	6/24	3/26	7/24	9/19	4/25	5/28	6/25	7/24	8/12	9/19	10/22	Mean	6/1
NJ 1190	6.7	5.7	2.7	8.7	9.0	9.0	6.0	7.3	8.3	8.7	7.0	7.7	7.7	7.5	74.7
NJ-GD	8.0	3.3	3.0	7.7	9.0	9.0	5.3	7.3	8.7	8.7	8.0	7.3	7.3	7.5	139.3
ECLIPSE	8.3	3.0	3.0	8.3	9.0	9.0	5.0	7.0	9.0	9.0	7.0	7.3	8.0	7.5	89.3
CARDIFF	8.0	1.3	2.3	7.7	9.0	8.3	5.7	8.0	9.0	8.7	7.3	6.3	7.0	7.4	114.0
SRX 22O5	8.0	2.7	1.7	8.3	9.0	9.0	5.7	7.0	9.0	8.7	6.7	7.7	7.0	7.4	110.3
J-1567	6.7	4.3	3.0	8.0	9.0	8.7	6.0	7.3	8.0	8.0	7.0	7.7	7.3	7.3	94.3
ZPS-2183	8.0	3.3	3.0	8.0	9.0	8.3	6.0	7.7	8.7	8.3	7.3	6.3	6.7	7.3	71.3
BA 79-260	8.0	4.0	3.0	8.7	9.0	8.0	5.7	7.3	8.7	8.3	6.7	7.0	7.0	7.2	129.3
MED-1497	7.0	3.3	2.3	8.7	9.0	9.0	5.3	6.3	8.0	8.0	7.7	7.3	8.0	7.2	106.7
CHATEAU	7.7	3.0	2.3	8.0	8.7	8.7	5.3	7.3	8.3	8.3	6.7	7.3	7.3	7.2	93.7
J-1576	8.0	2.3	3.0	7.7	9.0	8.7	5.3	7.3	9.0	8.3	7.3	6.3	7.0	7.2	125.0
PST-B3-180	7.3	4.0	3.3	8.7	9.0	8.3	5.0	7.3	8.0	9.0	7.0	6.7	7.0	7.1	90.3
BA 73-373	7.7	3.3	2.7	8.3	8.7	9.0	5.7	7.3	8.7	8.3	6.0	6.7	7.0	7.1	130.7
BARON	6.7	4.7	3.0	8.0	9.0	8.7	6.0	6.7	8.0	8.3	6.7	7.0	7.0	7.1	102.7
WILDWOOD	7.7	2.7	3.3	7.3	9.0	8.3	6.0	7.3	8.0	8.7	5.7	6.7	7.3	7.1	47.3
JEFFERSON	8.0	2.7	2.3	7.3	8.7	8.7	5.0	6.7	8.7	8.0	7.0	7.0	7.3	7.1	10.7
ASCOT	6.0	3.0	3.0	8.7	9.0	9.0	5.7	7.0	8.3	8.7	6.3	7.0	6.7	7.1	142.7
LTP-620	6.0	4.7	2.7	8.7	9.0	8.3	6.0	7.0	8.0	8.7	6.3	6.7	6.3	7.0	123.3
BAR VB 3115B	6.0	3.3	2.3	9.0	9.0	8.7	6.0	6.7	8.0	8.7	6.3	6.3	7.0	7.0	79.7
GLADE	6.0	3.3	2.3	7.7	8.7	9.0	5.0	7.0	7.7	8.7	6.0	7.0	7.3	7.0	90.0
HAGA	7.3	4.3	2.7	8.7	9.0	8.3	5.3	7.0	8.3	8.3	6.0	7.0	6.7	7.0	31.3
KENBLUE	8.0	4.3	3.0	7.3	9.0	8.7	5.0	6.3	8.0	8.7	6.0	7.3	7.3	7.0	92.3
PRINCETON 105	6.7	3.3	2.3	8.0	8.7	8.7	5.3	7.0	8.0	7.7	6.0	7.3	7.0	6.9	122.7

Table 1. cont.

Cultivar	Color[1]	Spring Green-up[2]	Leaf Texture[3]	Density[4]			Quality[5]								Sod Strength[6]
	6/24	3/26	6/24	3/26	7/24	9/19	4/25	5/28	6/25	7/24	8/12	9/19	10/22	Mean	6/1
ABBEY	5.7	3.0	2.0	8.7	9.0	8.7	5.3	7.0	8.3	8.0	6.3	6.3	7.0	6.9	121.0
SR 2000	8.3	3.7	3.3	7.3	8.7	8.7	5.3	6.7	7.3	8.0	6.7	7.0	7.0	6.9	137.0
NUGLADE	6.3	4.7	2.3	8.0	9.0	8.7	5.7	6.7	8.3	8.0	6.3	6.7	6.3	6.9	120.7
PST-A7-60	6.3	3.0	2.7	8.3	9.0	8.3	5.3	6.0	8.0	8.7	6.3	6.3	7.3	6.9	93.3
J-257	8.0	2.7	2.3	7.3	8.7	8.7	4.3	6.7	9.0	8.0	6.7	6.7	6.3	6.8	90.0
AMERICA	7.0	3.0	2.3	8.0	9.0	8.7	5.7	7.0	8.0	8.0	5.7	6.3	7.0	6.8	119.3
BARONIE	8.0	2.3	2.3	7.3	8.7	8.3	5.0	7.3	8.3	8.3	5.7	6.3	6.7	6.8	66.3
BA 77-702	6.7	3.3	3.0	8.7	8.7	8.7	6.0	7.0	7.0	8.0	6.3	6.3	7.0	6.8	114.0
RAVEN	5.7	4.0	2.7	8.3	9.0	9.0	6.0	7.0	8.3	8.0	6.0	6.3	6.0	6.8	71.0
MIDNIGHT	8.0	1.7	4.0	7.3	8.3	7.7	6.0	7.3	8.0	8.3	5.0	6.3	6.7	6.8	100.7
ZPS-429	7.0	4.0	3.7	8.3	8.3	8.3	6.0	6.3	8.0	7.7	6.7	6.7	6.0	6.8	98.7
LIMOUSINE	7.0	3.3	3.3	8.7	9.0	8.3	4.7	6.0	8.7	8.7	6.7	6.3	6.3	6.8	121.3
SR 2109	6.3	2.3	3.0	7.3	8.7	8.0	5.3	7.0	7.7	7.7	5.3	7.3	7.0	6.8	100.0
NUSTAR	8.0	2.7	2.3	6.7	8.7	8.7	4.3	6.3	8.3	8.0	7.3	6.3	6.7	6.8	100.3
BAR VB 233	7.0	4.0	3.0	8.3	8.7	8.3	5.0	6.3	8.0	8.0	6.3	6.3	7.3	6.8	56.7
ALLURE	8.0	2.3	2.7	7.0	8.7	8.7	4.7	6.3	7.7	8.3	7.0	6.3	6.7	6.7	47.7
BA 75-490	7.3	3.3	3.0	8.0	9.0	8.0	5.0	7.0	7.7	8.0	6.3	6.3	6.7	6.7	78.0
PST-638	6.3	1.7	3.3	7.7	9.0	8.7	4.3	6.7	7.7	8.7	6.3	6.3	7.0	6.7	84.7
VB 16015	7.3	2.0	3.0	6.7	9.0	8.7	5.3	7.0	8.3	8.3	5.3	6.7	6.0	6.7	39.3
COMPACT	6.7	3.3	3.3	7.7	8.7	9.0	4.3	5.3	8.3	9.0	6.7	7.0	6.0	6.7	48.7
BA 75-163	6.3	2.0	3.0	7.7	9.0	8.7	4.0	6.3	8.7	8.3	5.7	6.3	7.0	6.6	71.3
PST-B2-42	7.7	3.7	3.7	8.3	8.3	8.3	4.3	7.0	8.0	8.0	5.3	6.3	7.3	6.6	93.3
HV 242	7.3	3.3	3.3	8.3	9.0	8.0	4.7	6.7	8.0	8.3	5.7	5.7	7.0	6.6	99.7
CHALLENGER	7.7	4.0	3.0	7.7	8.7	8.7	4.7	6.0	7.7	8.3	6.3	6.3	6.7	6.6	30.7
PST-A418	7.0	1.7	1.7	8.0	8.7	8.7	4.3	7.0	8.3	8.0	6.3	6.0	6.0	6.6	90.7
LIPOA	7.0	2.7	3.3	8.0	9.0	8.0	5.3	6.3	8.3	8.0	6.3	5.3	6.3	6.6	65.0
ZPS-309	7.0	2.7	3.0	6.3	8.3	8.3	5.0	6.7	7.7	8.0	6.3	5.7	6.3	6.5	114.3
PST-B0-165	7.7	2.7	2.7	7.7	8.3	8.0	5.0	6.0	8.0	7.0	6.0	6.7	7.0	6.5	120.0
COVENTRY	6.0	2.7	2.7	6.3	8.3	8.0	4.0	6.7	7.7	7.3	6.3	6.7	7.0	6.5	74.3
BAR VB 6820	7.0	3.0	3.7	7.7	8.7	8.3	6.0	7.0	6.7	7.7	5.7	5.7	6.7	6.5	63.0
BA 76-372	6.3	2.3	2.0	8.0	9.0	8.0	4.7	6.7	8.0	8.0	6.0	5.7	6.3	6.5	88.0
NIMBUS	6.3	2.0	2.3	7.3	8.7	8.3	5.3	7.0	7.3	7.7	5.7	5.7	6.7	6.5	76.3
BA 81-227	7.3	2.7	4.3	7.0	9.0	7.7	5.7	6.7	7.3	8.0	5.0	5.7	6.7	6.4	82.7

Table 1. cont.

Cultivar	Color[1]	Spring Green-up[2]	Leaf Texture[3]	Density[4]			Quality[5]								Sod Strength[6]
	6/24	3/26	6/24	3/26	7/24	9/19	4/25	5/28	6/25	7/24	8/12	9/19	10/22	Mean	6/1
BAR VB 5649	6.3	5.0	3.0	7.7	8.7	8.3	6.0	6.7	7.3	7.7	5.7	6.0	5.7	6.4	110.7
J-2582	6.3	4.0	3.0	7.3	9.0	8.0	5.7	6.7	7.0	8.0	5.3	5.7	6.7	6.4	96.3
BA 87-102	7.0	3.7	2.7	8.0	8.7	8.0	5.7	5.7	7.7	7.7	6.3	5.7	6.3	6.4	60.0
LPT-621	7.0	2.0	2.7	7.7	8.3	8.0	5.7	6.3	7.3	7.0	5.7	6.0	7.0	6.4	44.3
MARQUIS	6.3	3.0	2.3	8.7	9.0	8.3	5.3	6.7	7.0	8.3	6.0	6.0	5.7	6.4	49.7
PST-BO-141	8.7	3.0	4.0	7.3	8.3	7.7	4.3	7.0	8.3	8.0	4.7	6.0	6.7	6.4	71.3
UNIQUE	7.0	3.3	2.3	7.7	8.7	8.7	6.0	6.3	6.3	8.0	6.0	6.0	6.3	6.4	109.7
BARTITIA	7.0	3.0	3.3	7.3	8.3	8.3	5.3	6.0	8.0	7.3	5.3	6.7	6.3	6.4	110.0
PICK 8	6.7	1.3	3.3	6.7	8.7	8.3	5.0	6.7	7.3	8.0	5.7	6.0	6.0	6.4	65.7
BA 81-220	6.3	5.3	2.7	8.0	8.7	8.0	5.7	6.0	6.0	7.3	6.7	7.0	6.0	6.4	132.3
ZPS-2572	7.0	2.0	3.3	7.0	8.7	8.0	4.3	6.7	7.3	7.7	6.0	6.0	6.7	6.4	80.7
SODNET	7.0	3.0	2.7	7.7	8.7	8.0	4.7	7.0	7.3	8.0	5.3	5.7	6.7	6.4	112.0
MED-18	6.0	3.7	3.3	7.3	9.0	8.3	5.0	6.3	7.3	8.0	5.3	5.7	7.0	6.4	127.7
LIVINGSTON	7.3	2.7	3.0	7.3	8.3	8.3	5.0	6.3	7.3	7.7	6.3	5.7	6.3	6.4	121.0
PICK-855	7.7	1.7	2.0	8.3	8.0	8.0	5.0	6.3	7.7	7.3	5.3	5.7	7.0	6.3	99.7
J-155	6.7	2.0	4.3	6.7	9.0	8.3	4.7	6.3	7.3	7.7	6.3	6.0	6.0	6.3	69.7
CALIBER	6.0	3.3	3.0	8.3	8.7	8.0	5.0	6.3	6.7	7.3	6.0	7.0	6.0	6.3	114.7
J-1561	6.7	2.7	3.0	7.3	8.7	8.0	5.7	7.0	7.0	8.0	5.3	5.0	6.3	6.3	87.0
DP 37-192	6.0	3.0	2.3	7.7	8.7	8.0	5.3	6.3	7.7	8.0	6.3	6.0	4.7	6.3	106.3
BA 75-173	7.3	1.3	3.3	7.0	8.7	8.0	5.7	6.7	7.7	7.7	5.0	6.0	5.3	6.3	72.3
NJ-54	6.0	4.0	3.0	8.3	8.7	8.3	5.0	6.0	7.0	7.7	5.3	6.0	7.0	6.3	102.7
SIDEKICK	7.3	2.0	2.3	7.3	8.3	8.7	4.7	7.0	8.3	8.0	5.3	5.3	5.3	6.3	81.3
SR 2109	5.7	3.3	3.3	8.0	8.7	8.0	4.7	6.3	7.0	8.0	5.7	5.3	6.7	6.2	87.0
BA 81-270	6.7	2.7	2.0	7.7	8.3	8.3	5.7	6.3	6.7	7.3	5.7	5.7	6.3	6.2	15.0

Table 1. cont.

Cultivar	Color[1]	Spring Green-up[2]	Leaf Texture[3]	Density[4]			Quality[5]								Sod Strength[6]
	6/24	3/26	6/24	3/26	7/24	9/19	4/25	5/28	6/25	7/24	8/12	9/19	10/22	Mean	6/1
H86-690	5.7	4.0	3.0	7.7	8.3	8.0	5.0	6.3	7.3	7.3	5.3	5.3	7.0	6.2	84.7
PICK 3561	7.0	2.0	3.3	6.7	8.7	8.0	5.0	6.7	7.0	7.3	6.0	5.0	6.3	6.2	66.0
BA 70-060	8.0	3.0	3.7	7.3	8.3	8.0	5.3	5.7	6.7	8.0	5.3	5.3	6.7	6.1	79.7
SHAMROCK	8.3	2.7	4.0	5.7	8.7	8.3	4.0	6.7	7.3	7.3	5.7	6.0	6.0	6.1	89.3
TCR-1738	7.3	3.3	3.0	7.7	9.0	8.0	4.3	5.0	8.0	7.3	6.7	5.3	6.3	6.1	35.7
CONNI	7.0	4.3	3.7	7.3	8.0	7.7	5.3	6.3	5.3	7.7	5.7	5.7	6.7	6.1	70.3
BA 81-058	5.7	3.3	2.7	8.3	9.0	8.3	5.3	5.7	7.0	7.7	5.0	5.7	6.3	6.1	97.7
SR 2100	7.0	2.7	2.7	8.0	9.0	7.7	4.7	5.7	7.3	8.0	5.0	6.3	5.7	6.1	136.0
BA 81-113	7.0	2.3	3.3	7.0	8.7	8.0	4.0	5.7	7.3	7.7	5.3	6.0	6.7	6.1	95.7
A88-744	7.3	1.7	2.7	7.0	8.3	7.7	4.3	6.3	7.3	8.0	5.0	5.7	6.0	6.1	81.3
FORTUNA	7.0	2.0	3.7	7.0	8.7	8.0	4.7	6.7	7.3	7.3	5.3	5.3	5.7	6.0	91.0
MED-1991	5.3	1.7	3.0	7.3	8.7	7.7	5.7	6.3	7.3	7.3	5.3	5.0	5.3	6.0	86.0
BA 76-197	5.3	3.3	3.0	8.3	9.0	8.7	4.3	6.0	6.7	8.0	5.3	5.7	5.7	6.0	40.0
PST-A7-245A	7.0	2.7	4.0	7.7	8.0	7.7	4.0	6.3	7.3	7.0	5.3	6.0	5.7	6.0	104.0
BARUZO	6.3	1.7	3.3	6.7	8.3	7.7	4.3	6.7	6.0	6.7	6.0	5.7	5.7	5.9	82.3
AWARD	7.7	2.7	3.7	7.3	7.0	8.3	4.0	6.0	8.0	6.3	4.7	5.7	6.3	5.9	76.3
J-1936	6.7	1.7	3.3	6.7	8.7	8.0	4.3	6.3	6.3	7.7	5.0	5.0	5.3	5.7	51.3
CLASSIC	7.0	1.7	3.7	7.0	8.3	7.3	4.7	6.0	6.3	7.0	4.7	5.7	5.3	5.7	68.0
BLACKSBURG	7.3	1.7	3.0	6.3	8.0	7.7	4.3	6.7	6.3	6.7	4.3	5.3	5.3	5.6	26.0
PLATINI	7.3	2.7	4.0	7.0	7.0	7.3	5.7	5.7	4.0	6.0	5.0	5.0	5.7	5.3	92.0
PST-P46	5.0	2.3	2.0	7.7	7.3	8.0	4.0	5.0	4.7	6.7	5.0	5.3	5.3	5.1	78.3
HV 130	7.7	2.0	2.7	7.0	6.7	6.0	4.3	6.3	5.7	5.3	3.3	4.0	5.0	4.9	41.7
MEAN	**3.0**	**7.0**	**2.9**	**7.7**	**8.7**	**8.3**	**5.1**	**6.6**	**7.6**	**7.9**	**5.9**	**6.2**	**6.5**	**6.5**	**86.9**
LSD (0.05)	**0.79**	**1.15**	**1.36**	**1.03**	**0.85**	**0.92**	**0.96**	**1.02**	**1.39**	**1.08**	**1.16**	**1.21**	**1.19**	**0.7**	**65.4**

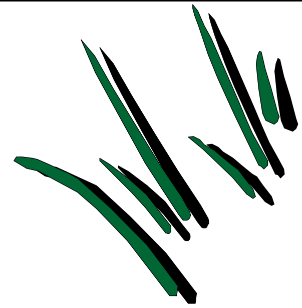
1. Color rating scale, 1-9, with 9=darkest.
2. Spring green-up scale 1-9, with 9=90-100% green.
3. Leaf texture rating scale 1-9, with 9=most desirable texture.
4. Turfgrass density 1-9 scale, 9=greatest density.
5. Turfgrass quality 1-9 scale, 9=highest quality.
6. Measured in lbs.

Table 2. Data from the 1995 national Kentucky Bluegrass low maintenance trial at the J.S. Anderson Turfgrass Research Facility near Mead, NE for 1997. University of Nebraska, 1997.

Cultivar	**Color**[1]	**Spring Green-up**[2]	**Texture**[3]	**Density**[4]			**Quality**[5]							
	6/23	**3/26**	**6/23**	**3/26**	**7/24**	**9/19**	**4/25**	**5/28**	**6/23**	**7/24**	**8/21**	**9/19**	**10/22**	**MEAN**
EAGLETON	8.0	2.0	2.0	8.0	9.0	9.0	4.0	7.0	9.0	9.0	7.0	7.0	7.0	7.1
MTT 683	6.7	3.7	4.0	8.3	8.7	8.7	6.0	7.7	8.0	7.7	6.7	7.0	6.3	7.1
BARTITIA	6.3	3.7	3.0	9.0	9.0	8.7	5.3	7.0	8.0	8.3	7.0	7.0	6.0	7.0
PST-B9-196	7.7	5.3	4.0	9.0	8.3	9.0	4.7	7.3	8.0	8.0	6.7	6.7	6.7	6.9
CALIBER	6.7	4.0	3.7	8.3	8.3	8.3	5.7	7.7	7.0	7.3	5.3	6.7	7.3	6.7
ZPS-429	9.0	2.3	5.0	8.0	8.3	7.3	4.7	7.3	8.7	8.0	5.3	6.0	7.0	6.7
BARUZO	7.0	2.3	3.0	8.7	9.0	8.3	4.3	7.0	8.0	9.0	6.3	6.3	6.0	6.7
CANTEBURY	5.3	4.3	3.3	8.3	8.3	9.0	5.3	6.7	7.7	7.7	6.7	7.0	5.7	6.7
BARONIE	7.3	5.7	3.3	8.7	8.3	8.7	4.7	7.3	8.0	7.7	6.0	7.0	6.0	6.7
LIPOA	7.3	2.0	2.3	8.3	9.0	8.3	4.0	6.7	7.3	8.7	5.7	7.0	7.3	6.7
BAR VB 3115B	5.7	5.7	4.0	9.0	8.3	8.7	5.3	7.7	7.7	8.0	5.3	6.3	6.3	6.7
BH 95-199	5.7	3.3	3.3	9.0	8.3	9.0	5.3	7.3	7.3	7.3	6.0	6.3	6.7	6.6
KENBLUE	7.7	4.0	5.0	8.3	8.0	8.0	6.7	8.0	5.7	7.3	5.3	6.3	7.0	6.6
VB 16015	7.3	1.3	3.0	8.0	8.3	7.7	6.3	7.3	8.0	8.0	5.0	5.3	6.0	6.6
SOUTH DAKOTA	6.0	3.3	3.3	8.7	8.0	8.3	5.3	7.0	7.7	7.3	6.3	6.3	6.0	6.6
BAR VB 5649	8.0	2.0	4.7	7.3	8.0	8.3	5.0	7.3	7.0	7.3	6.0	6.7	6.3	6.5
BAR VB 6820	7.0	1.7	4.3	8.7	8.0	8.0	5.3	7.3	7.0	7.3	5.7	6.7	6.0	6.5
PST-A7-60	7.0	1.3	2.0	9.0	8.7	7.7	4.0	6.3	8.3	8.3	4.7	5.7	6.0	6.2
BLUE STAR	5.3	3.7	1.7	8.3	8.7	8.0	6.3	6.7	7.0	7.3	5.3	5.0	5.3	6.1
BARON	5.0	4.3	1.3	9.0	8.0	8.0	5.7	5.7	7.3	7.0	4.7	4.7	5.0	5.7
BAR VB 233	8.0	1.3	3.7	7.3	8.3	8.0	3.3	5.0	4.7	7.7	5.0	6.7	6.0	5.5
MEAN	6.9	3.2	3.3	8.4	8.4	8.3	5.1	7.0	7.5	7.8	5.8	6.4	6.3	6.6
LSD (0.05)	**0.91**	**1.5**	**1.08**	**0.97**	**0.75**	**0.91**	**1.23**	**1.14**	**1.33**	**0.88**	**1.08**	**1.23**	**0.72**	**0.64**

1. Color rating scale, 1-9, with 9=darkest.
2. Spring green-up scale 1-9, with 9=90-100% green.
3. Leaf texture rating scale 1-9, with 9=most desirable texture.
4. Turfgrass density 1-9 scale, 9=greatest density.
5. Turfgrass quality 1-9 scale, 9=highest quality.

1996 National Tall Fescue Trial



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The National Tall Fescue trial was planted in September, 1996 at a seeding rate of 4.0 lbs./1000 sq. ft. The trial contains 130 entries planted in a completely randomized block design with 3 replications. Plot size is 4 feet by 5 feet.
Soil type is a Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll). Soil chemical analyses in the spring of 1997 showed a pH of 6.7, with 3.6% organic matter.

Turf height is maintained at 1.5 inches, and is mowed two times weekly. Nitrogen and potassium are applied at 4.0 lbs. N/1000 sq. ft. per year; phosphorous and potassium are applied according to soil test results. Irrigation is adjusted twice weekly to maintain an application rate of 60% ETp. Pendimethalin is applied annually at label-recommended rates for crabgrass control. Postemergence herbicides are applied only as needed. No fungicides or insecticides are applied.

pH	K ppm	Bray P ppm	Organic Matter %	CL IC ppm	CEC cmol/kg	K Exch cmol/kg	Na Exch cmol/kg	Mg Exch cmol/kg	Ca Exch cmol/kg	S ppm
6.7	462.3	37.37	3.6	4.26	31.02	1.29	0.16	3.73	17.52	6.3

In 1997, genetic color, leaf texture, turfgrass density, as well as monthly turfgrass quality were evaluated (Table). In July, brown patch (*Rhizoctonia solani*) occurred and was also rated.

1997 EVALUATIONS

Statistical analyses of monthly observations showed considerable variation among cultivars (Table). The mean turf color rating was relatively high (7.1), with many cultivars having ratings greater than 7.0, while only three cultivars (Arid, JTTFA-96, and KY-31 w/endo) had unacceptable ratings below 6.0. Texture ratings were relatively low, with a mean of 5.4; only four cultivars had ratings greater than 7.0 (Arid, JTTFC-96, ATF-192 and KY-31 w/endo). Cultivars also demonstrated seasonal differences in turfgrass density and quality. April densities ranged from 2.0 to 6.7, with 98 of the 130 cultivars having densities below 6.0. July and September densities improved, with only one cultivar, KY-31 w/endo having an unacceptable (<6.0) rating. None of the cultivars had acceptable early season quality ratings (an acceptable turfgrass quality rating is $\geq$6.0); April quality ratings ranged from 1.3 to 4.7. As the season progressed, however, quality improved and by October, only eight cultivars (Titan 2, DLF-1, Arid, AV-1, DP 7952, JTTFA-96, ATF-192, and KY-31 with endo) had quality ratings <6.0. Mean quality ratings ranged from 3.1 to 6.8 and reflected low quality ratings in April and May. Almost all the cultivars exhibited low to very low (i.e. $\geq$7.0) brown patch incidence ratings: three cultivars (MB 215, TA-7, and SR 8210) had moderate brown patch ratings.

Table 1. 1996 NTEP Tall Fescue Trial at the J.S. Anderson Ornamental and Turfgrass Research Facility near Mead, NE. University of Nebraska, 1997.

	COLOR[1]	LEAF TEXTURE[2]	DENSITY[3]			QUALITY[4]								BROWN PATCH[5]
CULTIVAR	6/24	6/24	4/25	7/30	9/20	4/25	5/28	6/25	7/30	8/21	9/20	10/22	MEAN	7/22
Pennington-1901	7.7	4.7	6.0	9.0	9.0	4.7	5.7	7.7	8.0	7.0	7.0	7.7	6.8	8.0
J-98	7.7	4.7	6.0	8.7	8.3	4.0	4.7	8.0	8.7	6.7	6.7	8.0	6.7	8.0
MB 26	8.0	4.0	6.3	8.7	8.7	5.0	5.7	8.0	8.0	6.0	6.3	7.7	6.7	8.0
AA-983	7.0	5.0	6.3	8.7	8.7	4.7	5.3	6.7	8.7	7.0	6.3	7.7	6.6	8.0
CU9501T	7.3	4.7	7.0	8.7	8.7	5.3	5.0	7.3	7.7	7.0	6.3	7.3	6.6	8.0
AA-A91	7.3	4.7	6.3	8.3	8.3	4.7	5.0	7.3	8.3	7.0	6.7	7.0	6.6	7.7
ATF-038	7.3	4.0	6.7	9.0	8.7	4.3	5.0	7.0	8.7	7.0	6.3	7.3	6.5	8.0
MB 29	8.0	5.0	6.3	8.3	8.3	4.7	5.7	7.3	7.3	6.7	6.0	7.7	6.5	8.0
Jaguar 3	6.7	4.3	6.0	7.3	9.0	4.7	5.3	8.0	6.3	6.7	6.7	7.7	6.5	8.0
LTP-4026 E+	8.0	4.7	6.0	8.3	9.0	4.0	5.0	7.3	7.7	7.0	6.7	7.7	6.5	8.0
Empress	6.7	4.7	5.7	8.3	8.7	4.3	5.3	8.0	7.3	6.0	6.3	7.7	6.4	8.0
Sunpro	7.0	4.3	5.7	8.7	9.0	4.7	5.3	7.3	7.3	6.3	6.3	7.7	6.4	7.7
Gazelle	8.0	4.3	6.0	8.0	9.0	4.3	5.3	8.3	6.3	6.0	6.7	8.0	6.4	8.0
MB 215	8.0	5.3	6.0	8.0	8.3	3.7	5.7	8.0	7.3	6.0	6.3	7.3	6.3	6.7
Pick GA-96	7.7	4.3	6.3	8.0	8.7	4.0	5.0	8.0	7.7	6.3	6.0	7.3	6.3	8.0
BAR FA 6LV	8.0	4.0	6.0	8.7	8.7	3.7	5.0	7.7	7.7	6.7	6.0	7.3	6.3	7.7
ATF-022	7.0	4.7	6.0	8.3	8.7	4.0	5.3	6.7	8.0	6.7	5.7	7.7	6.3	8.0
CU9502T	6.7	4.7	5.3	8.3	9.0	3.7	5.0	7.0	8.0	6.3	6.7	7.3	6.3	8.0
OFI-96-31	7.3	5.7	6.7	8.7	8.3	4.3	5.0	7.0	8.3	5.7	6.3	7.3	6.3	8.0
Falcon II	7.3	5.0	6.0	8.3	8.3	3.3	5.3	7.3	8.0	6.3	6.3	7.3	6.3	7.7
Duster	7.3	5.0	6.0	8.0	8.7	4.0	5.3	7.7	7.0	6.7	6.0	7.3	6.3	8.0
Apache II	7.0	5.0	5.7	8.3	8.3	4.3	5.3	7.3	7.3	6.0	6.3	7.3	6.3	8.0
Pick FA 20-92	7.7	5.0	5.7	8.3	8.7	3.7	5.3	8.0	7.0	6.7	5.7	7.7	6.3	8.0
BAR Fa6 US1	8.0	4.7	5.3	8.7	8.7	3.7	5.0	7.0	8.0	6.7	6.3	7.3	6.3	8.0
BAR Fa6 US2U	8.0	4.0	5.7	8.7	8.3	4.3	4.7	6.7	8.0	7.0	5.7	7.7	6.3	8.0
Pick FA B-93	7.3	4.0	5.7	8.7	8.7	3.7	5.0	7.3	7.7	6.3	6.3	7.3	6.2	7.7
BAR FA 6D	7.3	4.7	6.0	8.7	9.0	4.0	5.0	7.7	7.7	5.3	6.3	7.7	6.2	7.7
MB 28	8.0	5.7	6.0	8.0	8.3	4.7	5.3	7.3	7.0	6.3	5.7	7.3	6.2	8.0

Table 1 cont.

	COLOR[1]	LEAF TEXTURE[2]	DENSITY[3]			QUALITY[4]								BROWN PATCH[5]
CULTIVAR	6/24	6/24	4/25	7/30	9/20	4/25	5/28	6/25	7/30	8/21	9/20	10/22	MEAN	7/22
MB 216	8.0	5.3	5.7	8.3	8.7	4.3	5.0	7.7	7.3	5.3	6.3	7.7	6.2	8.0
Crossfire II	7.0	5.0	5.3	8.7	8.0	3.0	5.0	7.7	7.7	6.3	6.3	7.7	6.2	8.0
ZPS-5LZ	7.7	5.0	5.7	8.3	8.3	3.7	5.0	7.7	7.3	5.7	6.3	8.0	6.2	8.0
Tomahawk-E	7.0	5.0	5.3	7.3	8.3	3.3	5.0	8.0	7.0	6.3	6.7	7.3	6.2	8.0
J-3	8.0	5.3	6.3	8.7	8.0	4.0	5.0	7.3	8.0	5.7	5.7	7.3	6.1	8.0
BAR Fa6 US3	7.7	4.7	5.3	8.7	8.3	3.0	5.0	7.3	7.7	6.3	6.3	7.3	6.1	8.0
Pick FA 6-91	8.0	4.7	6.3	8.3	8.3	4.7	5.3	5.7	8.0	5.7	6.3	7.3	6.1	8.0
MB 214	7.7	4.7	6.3	7.7	8.7	4.7	5.0	7.0	6.7	6.0	6.3	7.3	6.1	8.0
Mustang II	6.7	6.0	5.3	8.7	8.3	3.3	4.7	7.7	7.3	6.3	6.0	7.3	6.1	8.0
Koos 96-14	7.0	6.0	6.0	8.7	8.3	4.3	5.0	7.0	8.0	6.0	5.7	6.7	6.1	8.0
MB 213	7.7	5.0	5.7	8.0	8.7	4.3	5.0	8.7	6.3	5.0	6.0	7.3	6.1	7.3
Southern Choice	7.3	4.7	5.7	8.7	9.0	3.7	5.0	7.7	7.7	5.7	6.0	7.0	6.1	8.0
OFI-FWY	7.0	4.0	5.0	8.0	8.3	3.7	5.0	7.3	7.0	6.0	6.3	7.3	6.1	8.0
TA-7	7.3	4.7	6.0	8.7	8.0	4.0	5.3	7.3	7.7	5.7	5.3	7.3	6.1	6.7
PST-5M5	7.0	4.7	5.3	7.7	9.0	3.7	5.0	8.0	6.0	5.7	6.7	7.7	6.1	8.0
OFI-951	7.7	5.0	5.3	8.0	8.7	3.7	5.0	7.3	6.7	6.0	6.0	7.7	6.1	8.0
OFI-931	7.3	4.3	5.0	8.3	8.7	3.7	4.7	7.0	7.0	6.0	6.3	7.7	6.1	8.0
LTP-SD-TF	7.3	5.0	5.0	7.3	8.7	3.7	5.0	7.3	6.3	5.3	7.0	7.7	6.1	8.0
ATF-196	7.0	5.0	6.3	8.0	8.3	4.0	4.7	6.3	7.0	6.7	6.3	7.3	6.1	8.0
Millennium (TMI-RBR)	7.7	5.0	6.0	8.0	8.3	3.7	5.3	6.7	7.0	6.3	5.7	7.7	6.1	8.0
WRS2	8.0	5.3	5.7	8.0	8.7	3.3	4.7	6.7	7.0	6.7	6.3	7.7	6.1	8.0
Pick RT-95	7.3	4.7	5.3	7.3	8.7	3.3	5.0	7.3	6.3	6.0	6.7	7.7	6.1	8.0
Pixie E+	7.3	5.3	6.3	8.3	8.0	4.3	5.3	5.7	8.0	6.0	5.7	7.0	6.0	8.0
Pick FA 15-92	7.7	4.3	5.7	8.3	8.0	3.7	4.7	7.7	7.3	5.3	6.0	7.3	6.0	8.0
EC-101	6.7	5.7	5.7	8.3	8.0	3.3	5.0	7.7	7.3	6.0	5.7	7.0	6.0	8.0
Coyote	8.0	5.0	5.3	7.3	8.7	3.7	5.0	7.3	6.3	6.0	6.3	7.3	6.0	8.0
PC-AO	7.0	5.3	5.3	8.3	8.3	3.3	5.0	6.7	8.0	5.7	6.0	7.0	6.0	8.0
ISI-TF9	7.3	5.7	5.0	8.7	8.3	3.0	5.0	7.3	7.3	5.7	6.0	7.3	6.0	8.0

Table 1 cont.

	COLOR[1]	LEAF TEXTURE[2]	DENSITY[3]			QUALITY[4]								BROWN PATCH[5]
CULTIVAR	**6/24**	**6/24**	**4/25**	**7/30**	**9/20**	**4/25**	**5/28**	**6/25**	**7/30**	**8/21**	**9/20**	**10/22**	**MEAN**	**7/22**
SRX 8500	7.3	5.0	4.7	8.0	8.7	3.0	4.3	7.0	7.0	6.7	6.7	7.0	6.0	8.0
ATF-020	7.0	4.7	5.7	8.3	8.3	3.0	5.0	6.7	7.0	7.0	6.0	7.0	6.0	8.0
J-101	7.3	4.7	6.3	7.7	8.3	4.3	5.0	5.7	7.3	6.3	5.7	7.3	6.0	8.0
Shortstop II	7.0	4.0	6.0	8.7	8.3	3.7	4.7	6.7	7.7	5.3	6.3	7.3	6.0	7.7
MB 211	7.7	5.3	5.3	8.3	8.3	3.7	4.7	7.0	6.7	6.0	6.3	7.3	6.0	8.0
Coronado	7.0	5.3	5.3	7.3	8.0	3.7	5.0	7.7	6.7	5.3	5.7	7.7	6.0	7.0
Marksman	7.0	5.0	6.0	8.3	8.7	4.0	4.3	6.7	6.7	6.3	6.3	7.0	5.9	7.0
pro 8430	6.7	5.7	4.7	7.7	8.3	3.3	5.0	7.7	6.7	6.0	5.7	7.0	5.9	6.0
Bonsai	7.0	5.3	4.7	8.3	8.0	3.3	4.7	7.3	7.3	6.0	5.7	7.0	5.9	8.0
Renegade	7.0	5.0	5.0	8.7	8.7	4.0	4.7	7.3	6.7	5.3	5.7	7.3	5.9	8.0
BAR Fa6D USA	7.3	5.0	5.0	8.0	8.0	3.0	4.7	6.7	7.0	6.0	6.3	7.3	5.9	8.0
AA-989	7.3	5.0	5.3	8.3	7.7	3.3	4.7	6.3	7.7	6.3	5.3	7.0	5.8	7.7
OFI-96-32	7.0	5.7	5.3	9.0	8.0	4.0	4.3	6.7	8.0	5.0	5.7	7.0	5.8	8.0
PSII-TF-10	7.3	6.0	5.3	8.0	8.0	3.7	5.0	7.0	7.0	6.0	5.7	6.3	5.8	8.0
SRX 8084	6.7	5.7	4.3	7.7	8.3	3.3	4.7	7.7	7.0	5.7	5.7	6.7	5.8	8.0
ZPS-2PTF	7.0	4.7	5.3	7.7	9.0	3.3	5.0	6.7	6.7	5.0	6.3	7.7	5.8	8.0
PST-523	6.7	6.0	4.3	8.0	8.3	3.0	5.0	7.0	7.0	6.0	5.7	7.0	5.8	8.0
WVPB-1D	6.3	5.7	5.3	7.7	7.7	3.3	5.0	6.7	7.3	5.7	6.0	6.3	5.8	8.0
PST-R5TK	7.0	6.3	5.0	7.7	8.3	3.0	4.7	6.0	7.0	6.3	6.3	7.0	5.8	8.0
MB 210	7.3	5.7	4.7	7.3	8.3	3.0	5.0	6.7	7.0	5.3	5.7	7.7	5.8	8.0
Shenandoah	6.0	5.7	5.3	8.3	5.3	3.7	4.3	7.0	7.3	5.7	5.7	6.7	5.8	8.0
MB 212	7.7	5.7	4.3	7.3	8.3	3.0	4.3	7.0	6.0	5.7	6.0	8.0	5.7	8.0
Lion	7.7	5.7	4.7	8.7	7.7	3.0	4.7	6.3	7.3	6.0	5.7	7.0	5.7	8.0
Tulsa	7.3	5.7	5.3	7.7	8.0	3.3	5.0	6.3	6.0	5.7	6.3	7.0	5.7	8.0
SR 8210	7.0	6.0	4.7	7.7	7.7	3.0	4.7	6.7	6.7	5.7	6.0	7.0	5.7	5.7
Pick FA XK-95	7.7	5.0	4.0	7.7	8.0	3.0	5.0	6.3	6.7	5.3	6.0	7.0	5.6	8.0
Regiment	6.0	6.0	4.0	8.0	8.3	3.0	4.7	5.7	7.0	5.3	6.0	7.3	5.6	8.0
ISI-TF11	7.0	6.7	5.0	8.0	8.0	3.3	5.0	6.3	7.3	5.3	5.3	6.3	5.6	8.0
SSDE31	6.3	5.7	5.3	7.7	8.3	3.7	4.3	6.7	6.7	5.7	5.7	6.3	5.6	8.0
Titan 2	6.0	6.3	5.3	8.3	7.3	4.0	4.0	7.0	7.7	5.7	5.0	5.7	5.6	8.0
Leprechaun	6.0	5.7	5.3	8.0	7.7	3.7	4.7	7.0	6.7	4.3	5.7	7.0	5.6	8.0
Alamo E+	7.7	5.0	6.0	8.3	7.7	3.0	4.0	6.0	7.3	5.7	5.7	7.0	5.5	8.0

Table 1 cont.

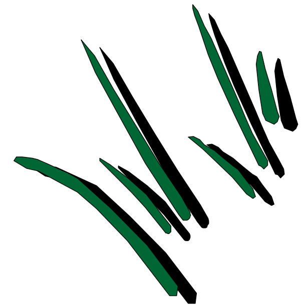
CULTIVAR	COLOR[1]	LEAF TEXTURE[2]	DENSITY[3]			QUALITY[4]								BROWN PATCH[5]
	6/24	6/24	4/25	7/30	9/20	4/25	5/28	6/25	7/30	8/21	9/20	10/22	MEAN	7/22
Bonsai 2000 (Bullet)	6.3	5.3	4.7	7.7	8.7	3.0	4.3	7.0	6.3	5.7	5.7	6.7	5.5	7.3
Pick FA UT-93	8.0	4.3	4.7	7.7	8.0	3.0	4.0	6.3	6.3	5.3	6.3	7.3	5.5	8.0
WVPB-1B	7.7	5.3	5.0	8.3	7.7	3.3	4.3	6.0	7.7	5.3	5.3	6.7	5.5	8.0
JSC-1	7.0	6.0	5.7	8.7	7.7	4.0	4.3	6.0	7.7	5.3	5.3	6.0	5.5	8.0
Cochise II	6.7	5.3	4.7	7.7	8.0	3.0	4.3	6.3	7.0	5.7	5.3	7.0	5.5	8.0
WX3-275	7.0	5.7	4.7	8.3	8.0	2.7	4.0	7.0	7.3	5.7	5.3	6.7	5.5	8.0
ISI-TF10	7.7	5.3	4.0	8.0	7.0	2.7	4.7	6.7	7.3	5.7	5.3	6.0	5.5	8.0
ATF-188	6.7	5.0	5.0	7.7	7.7	3.3	4.3	7.0	6.7	4.7	5.3	7.0	5.5	8.0
Safari	6.0	6.0	4.3	7.3	8.0	3.0	4.0	6.7	6.3	5.3	6.0	7.0	5.5	8.0
Anthem II (TMI-FMN)	7.0	5.3	4.0	7.7	7.7	2.3	4.0	6.3	7.0	6.0	5.7	6.7	5.4	8.0
Pick FA N-93	7.7	4.7	4.3	7.7	8.3	3.0	4.7	6.3	6.0	5.7	5.7	6.7	5.4	8.0
Genesis	7.3	5.3	4.7	8.0	7.3	3.3	5.0	6.0	7.0	5.3	5.0	6.3	5.4	8.0
PST-5E5	7.7	6.7	4.3	7.7	7.7	2.7	4.3	6.7	6.0	5.3	5.3	7.0	5.3	8.0
Tarheel	6.7	5.7	3.3	6.7	8.3	2.3	4.0	6.7	5.3	5.0	6.3	7.7	5.3	8.0
Aztec II (TMI-AZ)	6.7	5.7	4.3	8.0	7.7	2.7	4.0	5.7	7.0	5.3	5.3	7.0	5.3	7.7
DLF-1	6.0	6.0	5.3	7.7	8.0	3.7	4.3	6.0	7.0	5.0	5.3	5.7	5.3	8.0
EA 41	8.0	5.7	3.0	8.0	7.7	2.0	4.0	6.0	7.0	5.7	5.7	6.7	5.3	8.0
ATF-257	6.7	6.7	3.7	7.7	7.3	1.7	4.3	6.0	7.3	5.3	5.7	6.3	5.2	7.7
J-5	7.7	5.3	5.0	7.7	7.7	3.3	4.7	5.7	7.0	4.3	5.3	6.3	5.2	8.0
ATF-253	6.7	6.0	4.3	8.0	8.0	2.3	4.3	5.7	6.3	6.0	5.3	6.7	5.2	8.0
Finelawn Petite	7.7	6.0	4.7	7.0	7.0	3.0	4.7	6.3	5.3	5.0	5.7	6.7	5.2	8.0
PSII-TF-9	7.0	6.0	4.0	7.3	7.0	3.0	4.3	5.7	6.3	5.3	5.3	6.3	5.2	8.0
PST-5RT	7.3	6.0	3.7	7.7	7.3	2.7	5.0	5.7	6.0	5.0	5.3	6.7	5.2	8.0
Monarch	6.7	6.0	4.0	7.7	7.3	2.3	4.7	6.3	6.0	5.3	5.3	6.3	5.2	8.0
ATF-182	6.7	5.7	4.7	7.3	7.3	2.7	4.3	5.3	6.0	5.3	5.3	7.0	5.1	8.0
WVPB-1C	7.3	6.3	4.0	7.3	7.7	2.7	4.3	5.3	6.7	5.0	5.7	6.3	5.1	8.0
PST-5TO	6.7	6.0	4.0	7.0	7.7	2.7	4.3	5.7	6.3	4.7	5.0	7.3	5.1	8.0
BAR FA6 US6F	8.0	5.7	4.3	7.7	8.0	2.7	4.0	5.7	6.0	5.3	5.3	6.7	5.1	8.0

Table 1 cont.

	COLOR[1]	LEAF TEXTURE[2]	DENSITY[3]			QUALITY[4]								BROWN PATCH[5]
CULTIVAR	**6/24**	**6/24**	**4/25**	**7/30**	**9/20**	**4/25**	**5/28**	**6/25**	**7/30**	**8/21**	**9/20**	**10/22**	**MEAN**	**7/22**
Twilight II (TMI-TW)	7.3	6.3	3.7	7.3	7.0	2.0	4.3	6.0	6.3	5.0	5.0	6.7	5.1	8.0
DP 50-9011	6.7	6.3	3.3	7.7	8.0	1.7	3.7	5.7	6.3	5.0	5.7	6.7	5.0	7.7
SS45DW	7.0	6.3	3.7	8.0	7.7	2.3	4.0	5.7	6.0	4.7	5.7	6.3	5.0	8.0
Arid	5.0	7.3	4.7	7.3	7.3	2.3	4.0	6.0	6.7	5.3	4.7	5.3	4.9	7.7
AV-1	6.0	6.3	4.0	6.7	7.7	2.7	4.3	5.7	6.0	4.7	4.3	5.7	4.8	8.0
JTTFC-96	6.3	7.0	3.3	7.0	7.3	2.3	4.0	6.0	5.7	4.7	4.7	6.0	4.8	8.0
DP 7952	6.0	6.7	3.7	7.3	7.3	2.0	4.3	5.3	6.3	4.3	5.0	5.3	4.7	8.0
Equinox (TMI-N91)	7.0	6.0	3.7	7.7	7.0	2.3	4.3	5.0	6.0	4.7	4.3	6.0	4.7	8.0
RG-93	7.3	6.7	4.0	6.7	6.7	2.3	4.0	5.0	5.7	4.7	4.7	6.3	4.7	8.0
R5AU	7.0	6.7	2.3	7.0	6.7	1.3	4.0	5.0	6.0	4.3	4.3	6.3	4.5	7.7
PST-R5AE	7.0	6.3	2.7	7.0	7.0	2.0	3.7	5.0	5.0	4.7	4.7	6.3	4.5	8.7
JTTFA-96	5.3	6.3	2.7	6.3	7.0	2.0	3.3	4.7	5.0	4.3	4.7	5.0	4.1	8.0
ATF-192	6.3	7.0	2.3	6.3	6.0	1.3	3.3	4.3	5.0	4.0	4.3	5.7	4.0	8.0
KY-31 w/endo	4.7	9.0	2.0	5.7	5.0	1.3	3.3	3.3	3.7	2.7	3.0	4.0	3.1	7.7
MEAN	7.1	5.4	5.1	8.0	8.1	3.4	4.7	6.7	7.0	5.7	5.8	7.0	5.75	7.9
LSD (0.05)	**0.8**	**1.3**	**1.7**	**1.4**	**1.1**	**1.6**	**0.9**	**2.0**	**2.1**	**1.3**	**1.1**	**1.0**	**0.75**	**0.99**

1. Color rating scale, 1-9, with 9=darkest.
2. Leaf texture rating scale 1-9, with 9=most desirable texture.
3. Turfgrass density 1-9 scale, 9=greatest density.
4. Turfgrass quality 1-9 scale, 9=highest quality.
5. Brownpatch rating scale 1-9, with 1=greatest severity and 9=no disease.

1996 Buffalograss Trial



P.G. Johnson, T.P. Riordan and R.C. Shearman

The 1996 buffalograss test was planted at a number of sites around the country including at our research facility near Mead, Nebraska. An additional planting, although unsupported by NTEP, was established in 1997 at the Horticultural Research Center at Wichita, Kansas. Unfortunately data from locations other than Nebraska was not available at the time of writing this report.

The top performers in the Nebraska test were 91-118 and 86-61. Midget was the best in fall color ratings, but was average for summer quality. Diploid varieties like Stampede and UCR-95, did not survive the winter in Nebraska. '609' usually survives better than in this plot, but was especially hard hit, possibly due to the late planting of this plot area (July 12, 1996).

The seeded varieties showed few differences because of a "first year effect". All plots tend to look similar in the first year after planting. Differences will likely be more evident in this planting in 1998. Nonetheless, Tatanka and Bison showed slower establishment than the other varieties.

Table 1. National Turfgrass Evaluation Program 1996 Buffalograss Test†, Nebraska Location.

Entry	Turf Quality 1997	Entry	Fall Color 1997
	1-9		1-9
91-118	7.33	Midget	8.33
86-61	7.33	91-118	7.00
378	6.44	86-61	5.67
Bonnie Brae	5.44	86-120	4.33
86-120	5.22	378	4.00
Midget	3.56	Bonnie Brae	3.00
609	0.00	Stampede	1.67
Stampede	0.00	609	0.00
UCR-95	0.00	UCR-95	0.00
LSD (0.05)	1.12	LSD (0.05)	2.48

† Plot maintained as a low maintenance turf: (2.5 inch mowing height, mowed 1-2 times per month, 2 lb. N/1000 sq. ft./year, no supplemental irrigation)

Evaluation of Buffalograss Germplasm under Low Maintenance and Low-mowing Conditions

P.G. Johnson and T.P. Riordan

Buffalograss is most commonly used as a low maintenance turf with minimal fertilization and mowing, and no irrigation after establishment. Our low maintenance test areas are maintained at this level to select the hardiest, but best performing germplasm. We have also evaluated the species as one for use on golf course fairways in arid regions where superintendents need to make drastic cuts in their water use. We have observed that buffalograss does quite well at mowing heights even as low as 5/8" (1.4 cm). Our oldest plot in this evaluation has been mowed at 5/8" for 5 years and continually has provided high quality, low maintenance fairway-type turf.

Advanced evaluation, established 1994

NE86-61 and NE86-120 are at the top of most ratings, but rate lower in fall color, typical of the northern Great Plains adaptation of these varieties (Table 1). Three other accessions have also been near the top in most ratings. These include NE93-185, NE93-181, NE-91-181, and NE93-170. The last three accessions are males, which now can be used in seeded varieties or recombination blocks. Identification of superior male plants has been an important objective in our recent breeding efforts. NE93-181 is a good compromise between summer color and fall color, ranking high in both categories

Although the newly identified selections have not outperformed NE-86-61, they are valuable in recombination blocks and development of seeded varieties. All of these quality plants have been included in a new set of crossing blocks to evaluate potential F1 hybrids and for use in genetic studies.

Advanced evaluation, established 1995

Again, NE86-61 tops the evaluation in turf quality and color (Table 2). NE94-79 ranks fairly high in turfgrass quality, and high in fall color. NE90-164 shows good fall color, but only medium turfgrass quality ratings. This accession might be appropriate, however, for use in southern locations. A number of additional selections also show potential for use in recombination blocks and seeded varieties.

Cody and Tatanka are somewhat disappointing in this plot. Poor performance of Tatanka may be due to chromosome number irregularities. The use of several of the new selections from this program will improve the quality of upcoming seeded varieties.

Advanced evaluation, established 1996

NE86-61 tops this evaluation for color and turfgrass quality, as it has in other evaluations (Table 3). However, it has medium to poor fall color. Good compromises exist in NE95-22 and NE91-118. NE95-16 may be desirable germplasm for southern regions because of its good fall performance, but it doesn't overwinter well in Nebraska. Among other data taken, unmowed turf quality showed some different accessions also performing well, including NE86-61, NE86-120, and '315'. However, an additional years' data are needed for these comparisons to be meaningful.

Evaluation for Low-mowing tolerance

We currently have three plot areas being mowed at 5/8" for low-mowing tolerance evaluation. NE86-61 and NE86-120 have both performed well under these conditions. Our efforts now have turned to identifying additional germplasm for further improvement and to study the genetics of low-mowing tolerant traits.

Advanced Evaluation, established 1993

This plot area was mowed at 6.3 cm (2.5") until 1996, then gradually lowered to 1.4 cm. Although it exhibited unevenness in 1997, the plot still provided good evaluations (Table 4). 1997 was the first year for low-mowing data on this plot.

92-135 outperformed all other entries in this plot in summer turf performance, even '315', which had showed very good low-mowing tolerance in the earlier evaluation. Fall color characteristics need to be further improved and are one of the focuses of current breeding research, although limitations of warm-season grasses will prevent fall color as seen in cool season grasses.

Preliminary Evaluation, established 1995
Preliminary tests of recovery from damage were carried out and gave promising results. The turf recovered from divots within one month, with some selections recovering earlier. More extensive tests will be done beginning in 1998.

Preliminary Evaluation, established 1996

This plot area was established with progeny from a crossing block of six parents that showed tolerance to low mowing and has allowed study of parental effects on low mowing tolerance. A number of quantitative measurements were taken on these plants to test differences between the families and individual progeny, and to follow traits important to turfgrass quality (Table 5).

The families with the overall best summer ratings and vigor characteristics were progeny of 86-61 and 85-648. This correlates with the good turf performance of the parents. Families with desirable and uniform progeny performance will be evaluated for use in seeded cultivars tolerant to low mowing. This family analysis has not been done previously in buffalograss breeding.

Table 1. Low maintenance† evaluation established in 1994.

Selection	Turf Quality 1997	Color 1995-97	Fall Color 1995-97	Turf Quality 1995-97
	1-9	1-9	1-9	1-9
86-61	6.12	6.33	4.75	6.93
93-185	5.83	6.26	4.00	6.30
93-181	5.83	3.85	6.58	6.22
91-181	5.67	5.85	2.67	6.30
86-120	5.50	5.48	3.25	6.37
91-118	5.53	4.52	5.75	5.48
93-170	5.33	5.85	2.08	6.22
'Texoka'	4.83	4.37	5.58	4.56
'Sharps Improved'	4.83	4.82	5.83	4.44
LSD (0.05)	1.08	0.47	0.77	0.60

† Plot maintained as a low maintenance turf: 2.5 inch mowing height, mowed 1-2 times per month, 2 lb. N/1000 sq. ft./year, no supplemental irrigation

Table 2. Low maintenance† evaluation established in 1995.

Selection	Turf Quality 1997	Turf Quality 1996-97	Fall Color 1997
	1-9	1-9	1-9
86-61	6.67	6.60	3.89
'315'	5.83	6.07	3.89
91-118	4.17	5.60	5.56
94-100	4.83	6.33	4.67
'Cody'	5.00	5.20	5.33
'Tatanka'	5.00	5.13	4.67
'Texoka'	4.33	4.67	5.89
90-164	5.67	5.47	7.11
LSD (0.05)	0.96	0.64	0.60

† Plot maintained as a low maintenance turf:: 2.5 inch mowing height, mowed 1-2 times per month, 2 lb. N/1000 sq. ft./year, no supplemental irrigation

Table 3. Low maintenance† evaluation established in 1996.

Selection	Turf Quality 1997	Color 1997	Fall Color 1997
	1-9	1-9	1-9
86-61	6.11	6.22	5.33
95-36	5.78	4.00	4.33
'315'	5.67	5.22	3.67
95-22	5.44	4.22	6.33
91-118	5.44	3.78	6.33
95-20	5.33	4.56	5.33
93-166	4.11	5.78	4.33
95-37	4.89	5.44	6.33
95-16	3.22	4.67	7.67
95-11	3.56	3.22	7.00
95-14	4.67	4.89	7.00
95-8	3.67	4.94	7.00
LSD (0.05)	0.91	0.81	1.46

† Plot maintained as a low maintenance turf: 2.5 inch mowing height, mowed 1-2 times per month, 2 lb. N/1000 sq. ft./year, no supplemental irrigation

Table 4. Low mowing† evaluation, established 1993.

Selection	Turf Quality 1997	Spring Color 1997	Fall Color 1997
	1-9	**1-9**	**1-9**
92-135	7.00	5.00	3.00
91-114	5.89	4.67	5.00
'315'	5.44	3.67	4.00
91-118	4.11	1.67	7.00
'Texoka'	3.22	3.00	5.33
'Prairie'‡	0.00	0.00	0.00
LSD (0.05)	**0.93**	**0.85**	**1.46**

† Plot maintained at 5/8 inch mowing height, mowed2 times per week, 3 lb. N/1000 sq. ft./ year, no supplemental irrigation

Table 5. Low mowing† family progeny evaluation, established 1996.

Family	TQ97	Col97	Fall Color	Plant Width	2nd internode length	Leaves on 2nd node
	1-9	**1-9**	**1-9**	**cm**	**mm**	**no. of leaves**
86-61	5.28	3.48	4.45	38.5	27.7	12.13
85-648	5.18	3.55	4.68	39.9	30.0	13.08
86-120	4.18	2.88	4.46	36.0	30.8	13.13
85-443	3.99	2.74	4.18	30.6	32.3	13.69
'315'	3.81	3.00	4.23	27.6	24.9	12.68
86-23	3.05	2.24	4.13	22.5	30.0	11.55
LSD (0.05)	**0.72**	**0.39**	**0.50**	**5.9**	**5.7**	**2.8**

† Plot maintained at 5/8 inch mowing height, mowed 2 times per week, 3 lb. N/1000 sq. ft./year, no supplemental irrigation

We now routinely use flow cytometry to evaluate ploidy level of accessions used in our program. Most are hexaploid (60 chromosomes) but a significant number are tetraploid (40 chromosomes). As we evaluate more accessions, we will begin to correlate ploidy level with field characteristics. Diploid types do not survive winters in Nebraska. One pentaploid (50 chromosomes) was observed, cultivar '315'. This is the first record of a pentaploid buffalograss.

Southern Great Plains germplasm

We cooperated with Dr. Dick Auld of Texas Tech University in a study of a large collection of buffalograsses collected systematically throughout the southern Great Plains. Two-thirds of the 230 accessions studied were hexaploid, about one-quarter were tetraploid, eight were diploid, and five were pentaploid. This was the first time pentaploid accessions were observed I plants collected from natural stands. The cultivar '315' is also pentaploid, but was the product of controlled breeding efforts. Two additional plants from the Texas Tech program were identified as triploids.

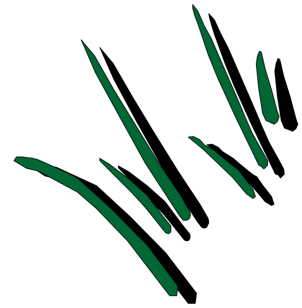
Study of Tatanka

As mentioned above, '315' is a pentaploid, and it is one of the parents in the seeded Native Turf Group (NTG) variety 'Tatanka'. In fact, it is the only female parent in the foundation seed fields. When the NTG seed producers began reporting poor seed harvests and management problems, we began to suspect genetic causes due to the pentaploid parent(s). Inbreeding depression may also cause these problems. We have begun a test to investigate this variety for chromosomal irregularities and inbreeding depression. This study should yield information on gene action in buffalograss. It may also lead to advances that could be used in seeded single cross varieties, to name one application.

Variation in Chromosome Number Among Buffalograss Genotypes

P.G. Johnson

Wildflower/Prairie Grass Establishment and Consumer Preferences



G.L. Davis and J. Schimelfenig

Wildflowers and prairie plantings continue to be popular in roadside, park, acreage, residential and other landscapes. These plantings are often attempted, however, with the notion that the composition of the planting will remain static over time with little or no maintenance. Plots were seeded in June 1997 for a long-term evaluation of various mixtures including combinations of annual and perennial wildflowers with and without prairie grasses (Table 1).

One aspect of the study involves assessing consumer preferences for wildflower-prairie grass mixes. Nine combinations of wildflower and prairie grasses were compared for consumer preference during the September 1997 Festival of Color. Nine thousand participants attended the annual event at the John Seaton Anderson Turfgrass and Ornamental Research Area at the University of Nebraska's Agricultural Research Development Center near Mead, NE. Of the approximately 850 participants who visited the wildflower plots, 300 completed our establishment year survey.

Results from the first year indicate that a majority (72%) of respondents were homeowners, most (89%) of whom do their own yard work. A majority (89%) of the respondents, including 59% who lived in single family dwellings in town, considered a low maintenance landscape to be an important way in which to conserve resources such as water and fertilizer, and reduce pesticide use.

Most (59%) respondents perceived a low maintenance landscape to be one that requires less time for yard work, and regarded prairie wildflower plantings to be low maintenance. However, establishment of wildflowers plantings requires extensive maintenance time during the first year. Based on our related studies, we determined it would require approximately 88 hours of weeding to establish wildflowers in the majority of respondents' yards, which they reported were between 5,000 to 10,000 ft^2 in size.

The majority (56%) of participants preferred combinations that included annuals but excluded prairie grass. The majority (66%) disliked the combinations of prairie grasses without the inclusion of wildflowers. Most of the annuals were in full bloom by the time of the festival. Although some of the perennials and grasses were blooming at the time of the festival, they would generally not be expected to be near their peak floral display nor as showy as the annuals after three months of growth.

Because this study will evaluate the dynamics of establishment and public perception over time, the survey will continue to be conducted on these plots at future Festivals of Color and other events. Information we gain from these studies on mixture selection and establishment and management techniques should benefit not only the seed and plant material providers, but also those who use these materials in their landscapes.

Table 1.

Wildflower and Prairie Grass Species, 1997 Planting*

Botanical Name	Common Name
Achillea millefolium	(yarrow)
Aster novae angliae	(New England aster)
Cassia chamaecrista	(partridge pea)**
Centaurea cyanus	(cornflower)**
Coreopsis lanceolata	(lance-leafed coreopsis)
Coreopsis tinctoria	(plains coreopsis)**
Chrysanthemum maximum	(shasta daisy)
Dalea purpurea	(purple prairieclover)
Echinacea purpurea	(purple coneflower)
Gaillardia aristata	(blanketflower)
Gaillardia pulchella	(Indian blanket)**
Heliopsis helianthoides	(false sunflower)
Hesperis matronalis	(dames rocket)
Liatris pycnostachya	(thickspike gayfeather)
Liatris spicata	(spiked gayfeather)
Linum lewisii	(blue flax)
Lupinus perennis	(perennial lupine)
Monarda citriodora	(lemon mint)**
Rudbeckia hirta	(blackeyed susan)
Ratibida columnifera	(Mexican red hat)
Ratibida columnifera	(upright prairieconeflower)
Ratibida pinnata	(grayhead coneflower)
Prairie Grass Mixture:	
Buchloe dactyloides	(buffalograss)
Schizachyrium scoparium	(little bluestem)
Bouteloua gracilis	(blue grama)
Bouteloua curtipendula	(sideoats grama)

* The authors wish to thank Stock Seed Farms, Murdock, NE., for providing the seed for this study.

** Denotes species usually considered as annuals in Nebraska.