1982 TURFGRASS RESEARCH SUMMARY

UNIVERSITY OF ILLINOIS

AT URBANA-CHAMPAIGN

(NOT FOR PUBLICATION)

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1982 TURFGRASS RESEARCH SUMMARY

This booklet presents the results for 1982 of experiments being conducted in turfgrass management at the University of Illinois. We hope that the information contained in this booklet will be of value when making management decisions. Several new experiments were established in 1982. These experiments are mentioned briefly in this report but will be given more in depth coverage as we start to collect data.

The Research Summary provides the data we have obtained in 1982. It does not give a total picture of our research effort. We urge you to attend our field day which will be held on July 27, 1983 to observe the turf plots in person. We feel that after seeing the plots the information presented in this booklet will be more meaningful.

We would like to thank you, the turfgrass professionals of Illinois, for your support of our program at the University of Illinois. Through your attendance at the annual conference and golf days, funds are raised to conduct research in turfgrass science. Without your support, our activities would be greatly reduced. We would like to thank the Illinois Turfgrass Foundation for publishing this report in cooperation with the University of Illinois.

David Wehner
Tom Fermanian
Jean Haley

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USDA NATIONAL KENTUCKY BLUEGRASS TRIAL

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

Kentucky bluegrass (Poa pratensis) is the primary turfgrass used for home lawns in Illinois. The many available cultivars of Kentucky bluegrass differ considerably in characteristics such as quality, color, density, texture, stress tolerance, and resistance to disease. The University of Illinois turf program is one of 35 participants in a nationwide Kentucky bluegrass cultivar evaluation. This evaluation will examine the responses of 84 cultivars to various environments and cultural regimes. At our Urbana research facility the trial has been established on a silt loam soil. A duplicate trial has been established on a pure sand soil at our Kilbourne facility. The soil at these sites differs primarily in nutrient and moisture holding capacity.

Urbana

The Urbana evaluation was established on September 15, 1980. Plot size is 5 x 6 feet and each cultivar is replicated three times in a randomized complete block design. Prior to establishment the area was fertilized with a 12-12-12 analysis material at the rate of 1 lb N/1000 sq ft. After seeding, plots were covered with Soil Guard, a synthetic spray mulch and irrigated as needed. In 1981 the area received a total of 4 lb N/1000 sq ft. The turf was mowed 2 to 3 times per week at 1.5 inches. The plots were not irrigated, however excessive rainfall during the summer months prevented any drouth stress from occuring until late September.

In 1982 the bluegrass plots were fertilized in April, June and September with 1 lb N/1000 sq ft. per application. A preemergence crabgrass control herbicide was applied April 26. The area was irrigated as necessary to prevent wilt.

Turfgrass cultivars differed widely in their performance throughout the 1982 season (Table 1). In general quality was lower than turf quality in the previous growing season due to reduced nitrogen application and rainfall in 1982. Most cultivars reached a peak in quality in June and then declined in the more stressful months of July, August and early September. October evaluations indicate most cultivars had recovered from late summer stress.

Resistance to dollar spot disease most seriously affected the cultivars late summer-early fall performance. Cultivars that showed little resistance to dollar spot were Bono, Enmundi, Geronimo, Birka, Vantage, Lovegreen, Nugget, Ram 1, Welcome, Mystic and the experimental cultivars WW AG 480, PSU-150 and PSU-173. Although leaf spot was a problem for some cultivars, most notably Cello, H-7, NJ 735, S. D. Common and Wabash, the majority of cultivars was not seriously injured by this disease.

Mowing quality was highest in late spring, however some cultivars mowed poorly even at this time. Those cultivars exhibiting a poor response to mowing with a reel-type mower are S. D. Common, Kenblue, Vantage, K3-162, MER PP 43 and S-21.

In general, 1982 turfgrass density was good to excellent. The cultivar WW AG 478 had exceptional density and uniformity. Other cultivars that maintained high density were Welcome, Bono, Kimono, Mona, Ram 1, Touchdown, Barblue, Birka, Cello, Eclipse, Enmundie, Lovegreen, Monopoly, Nugget, Sydsport and the experimental varieties A20-6, PSU-150, PSU-173, and K3-178.

Kilbourne

The trial at the Illinois River Sand Field, Kilbourne, was established April 6, 1981. Dolomitic limestone was applied to the area at 1.5 tons/A in the fall of 1980. Prior to seeding, fertilizer was applied as 34-0-0 (1.6 lb N/1000 sq ft), 0-44-0 (110 lb/A), 0-0-60 (280 lb/A) and potassium magnesium sulfate (180 lb/A). Both complete analysis fertilizers (water soluble nitrogen source) and slow-release nitrogen fertilizers were applied throughout 1981, totalling 6.5 lb. N/1000 sq ft. Granular Tupersan, a preemergence crabgrass herbicide was applied at seeding at a rate of 6 lb ai/A. A second application of Tupersan WP was made on May 18, 1981 at a rate of 6 lb ai/A. Basagran at 1 quart/A was applied on September 19 and September 28, to control nutsedge. Irrigation is essential for turf growing in a pure sand soil. Although excessive rainfall characterized the 1981 growing season, plots were still irrigated to prevent moisture stress. Plots were irrigated as follows: 3.0"/April in 10 applications, 1.3"/May in 5 applications, 2.8"/June in 4 applications, 3.4"/July in 4 applications, 4.2"/August in 5 applications and 2.5"/September in 3 applications.

During the 1982 growing season the turf was fertilized with a 12-12-12 analysis fertilizer. Applications were made in April, June, August, and October at a rate of .6 lb N/1000 sq ft per application. The preemergence herbicide siduron (Tupersan) was applied at a rate of 6 lb ai/A on April 28 and June 9. Plots were irrigated to prevent moisture stress as follows: 3.0"/May in 5 applications, 1"/June in 1 application, 6.0"/July in 4 applications, and 6.0"/August in 6 applications.

Turfgrass cultivars differed widely in quality throughout the 1982 season (Table 2). In general, turfgrass quality remained poor to fair due to frequent periods of drouth when irrigation water was not available. Turfgrass recovery from drouth stress differed among cultivars with Cello, Admiral, Bristol, Sydsport and the experimental varieties K1-152, SH-2 and 243 showing the most rapid recovery. The higher quality ratings in late August reflect cultivar performance when moisture is adequate.

By June, turfgrass density was fair to good and most cultivars had recovered from the serious thinning caused by Pythium blight in July 1981. In 1982 no disease was evident on the turfgrass plots and there were no major problems with any of the weed species present.

Table 1. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Urbana.[1]

Cultivar	Spring[2] Greenup 3/16	Quality[3] 4/22	5/18	6/18	7/20	8/18	10/12	All Dates[4] 1982	Leaf[5] Spot 6/12	Dollar[5] Spot 9/16	Mowing[6] Quality 6/1	Color[7] 6/24	Density[8] 6/24
Eclipse	1.3	5.3	7.3	7.0	8.0	7.0	8.0	7.1	7.0	7.0	6.7	7.7	7.7
A20-6	1.7	5.7	8.3	8.0	6.7	6.0	7.3	7.0	6.3	5.7	7.3	6.0	8.0
I-13	2.7	6.7	7.0	7.3	6.7	5.7	8.0	6.9	6.3	4.7	7.0	7.0	7.3
PSU-150	1.0	5.7	7.0	8.0	8.0	6.3	5.7	6.8	8.7	2.7	7.3	7.3	8.0
Mona	7.3	7.0	7.0	7.0	6.3	6.0	6.7	6.7	6.3	4.7	4.7	6.0	8.0
PSU-173	1.0	5.3	6.7	7.7	7.3	5.7	7.0	6.6	8.0	2.7	8.0	7.3	8.0
Touchdown	1.0	5.0	7.0	7.7	7.0	6.0	7.0	6.6	5.3	4.0	7.0	6.3	8.0
A20	3.3	5.3	7.0	7.7	6.7	6.0	6.7	6.6	6.0	4.7	5.3	6.0	7.7
CEB VB 3965	3.0	5.3	7.0	6.7	7.3	5.7	7.3	6.6	6.7	4.0	6.7	7.3	7.3
Cello	1.7	6.7	7.7	7.3	6.3	5.7	5.7	6.6	5.0	3.7	6.3	6.3	7.7
SH-2	5.0	5.7	7.0	7.3	6.3	6.0	7.0	6.6	6.0	7.7	6.3	6.7	7.0
Adelphi	2.7	6.0	7.0	6.7	6.3	6.3	6.7	6.5	5.7	5.0	6.7	6.7	7.3
Enmundi	2.7	6.7	7.3	7.7	6.0	5.3	6.0	6.5	6.3	3.0	6.0	7.3	7.7
WW AG 463	6.7	6.7	7.0	7.0	6.3	6.0	6.0	6.5	6.3	4.3	6.0	6.0	7.3
WW AG 478	3.3	3.7	6.0	7.3	8.0	6.7	7.3	6.5	8.0	4.0	7.7	9.0	9.0
Admiral	4.3	5.7	6.3	6.3	6.7	6.3	7.3	6.4	6.0	5.7	6.3	7.0	7.0
Bonnieblue	5.0	6.0	7.3	7.3	6.3	6.0	5.7	6.4	6.3	4.3	6.3	7.0	7.0
K3-178	7.3	7.0	6.7	7.0	6.0	6.0	6.0	6.4	5.7	5.3	5.3	5.3	7.7
Sydsport	3.0	6.3	7.7	7.0	6.7	5.7	5.3	6.4	5.3	3.3	7.7	6.7	7.7
225	5.3	6.0	6.7	7.3	6.3	6.3	6.0	6.4	7.0	5.0	6.3	5.7	7.3
K3-179	1.3	6.0	7.0	6.7	6.3	6.0	6.3	6.4	5.7	4.0	6.0	7.0	7.0
WW AG 480	2.3	6.7	7.7	7.0	6.3	5.7	5.0	6.4	5.7	3.0	7.3	6.7	7.0
Mosa	1.0	5.3	6.7	7.3	6.7	6.3	5.7	6.3	5.3	3.3	6.3	7.3	7.3
Banff	7.7	6.7	7.0	7.0	5.0	5.3	6.7	6.3	7.0	5.7	4.3	5.7	7.3
Columbia	6.7	6.3	7.0	7.0	5.7	5.3	6.3	6.3	6.0	4.7	5.0	5.7	7.0

(continued)

Table 1. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Urbana.[1] (continued)

Cultivar	Spring[2] Greenup 3/16	Quality[3] 4/22	5/18	6/18	7/20	8/18	10/12	All Dates[4] 1982	Leaf[5] Spot 6/12	Dollar[5] Spot 9/16	Mowing[6] Quality 6/1	Color[7] 6/24	Density[8] 6/24
Rugby	6.3	6.3	7.0	7.0	5.7	5.7	6.0	6.3	6.0	4.0	5.7	5.7	7.3
A20-6A	2.0	5.7	6.3	7.0	6.3	5.3	6.7	6.2	6.3	5.0	6.0	5.7	7.0
Bono	1.0	6.0	6.3	8.3	7.0	5.3	4.3	6.2	7.3	3.0	7.0	7.0	8.0
Shasta	5.7	6.3	7.0	6.3	6.0	6.0	5.7	6.2	6.3	4.7	4.7	6.0	7.3
Wabash	2.3	6.3	6.0	6.3	6.3	6.0	6.3	6.2	4.7	4.0	6.0	6.7	6.7
America	3.7	5.7	6.0	5.3	6.3	6.7	7.0	6.2	5.7	5.3	7.0	7.0	7.0
H-7	2.0	5.7	7.0	6.3	6.3	5.3	6.3	6.2	5.0	7.7	7.0	5.3	7.3
Kimono	1.0	4.7	5.7	7.3	7.0	6.3	6.0	6.2	7.0	4.3	6.7	5.7	8.0
Monopoly	1.0	6.0	7.3	6.7	6.0	5.7	5.3	6.2	6.7	3.3	5.3	6.0	7.7
239	7.0	5.7	6.0	6.7	6.3	5.7	6.7	6.2	6.7	4.3	5.0	5.7	7.3
Birka	1.3	4.7	7.0	7.7	6.7	4.7	6.0	6.1	6.7	2.7	6.7	7.0	7.7
Bristol	2.7	5.7	6.3	6.3	5.7	5.7	7.0	6.1	6.0	6.3	7.0	6.7	6.3
Fylking	2.3	5.0	6.7	7.0	7.0	5.7	5.3	6.1	7.3	3.3	5.7	7.0	7.3
K1-152	7.7	6.7	6.7	7.0	5.7	5.7	5.0	6.1	6.0	5.0	5.3	5.7	7.0
Plush	4.0	4.7	5.3	6.7	6.7	6.0	7.3	6.1	5.7	6.0	7.3	7.0	6.7
Ram-1	3.0	4.7	6.7	7.7	7.0	5.0	5.7	6.1	7.7	2.3	7.0	7.7	8.0
SV-01617	2.7	4.7	6.7	6.7	7.0	6.0	5.7	6.1	7.7	4.0	6.0	7.7	7.0
Trenton	7.7	6.0	6.7	6.7	5.3	5.7	6.3	6.1	6.3	4.3	6.0	5.7	7.0
Barblue	5.3	6.3	6.7	7.0	5.0	5.3	6.0	6.0	7.0	7.3	6.3	6.3	7.7
K3-162	2.0	6.0	6.0	6.7	6.3	5.3	6.0	6.0	6.3	3.7	3.7	6.0	7.3
Lovegreen	2.0	4.7	6.7	7.3	7.7	4.3	5.7	6.0	6.0	2.3	5.3	5.7	7.7
P-141(Mystic)	5.3	5.0	5.7	7.3	7.7	4.3	6.3	6.0	8.0	2.0	7.3	8.0	7.3
Welcome	1.0	4.0	5.3	7.7	7.3	5.7	6.3	6.0	7.0	2.3	7.0	7.3	8.3
Escort	2.3	5.7	8.0	7.0	5.3	3.7	6.3	6.0	6.7	4.0	6.3	6.3	7.3
N535	6.7	5.7	5.3	6.0	7.0	6.0	6.0	6.0	6.7	5.0	7.3	8.3	6.7

(continued)

Table 1. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Urbana.[1] (continued)

Cultivar	Spring[2] Greenup 3/16	Quality[3] 4/22	5/18	6/18	7/20	8/18	10/12	All Dates[4] 1982	Leaf[5] Spot 6/12	Dollar[5] Spot 9/16	Mowing[6] Quality 6/1	Color[7] 6/24	Density[8] 6/24
Piedmont	4.0	6.3	6.3	5.7	6.7	5.7	5.3	6.0	5.7	3.7	4.3	5.7	6.3
A-34	5.0	5.7	6.3	6.7	6.0	6.0	5.0	5.9	5.7	3.7	5.0	6.3	7.0
MLM-18011	6.0	5.3	6.3	6.0	6.0	6.0	6.0	5.9	5.7	5.0	6.3	7.7	6.7
Vanessa	1.3	4.7	5.7	7.0	6.7	6.3	5.3	5.9	6.3	3.7	6.7	8.0	7.0
Majestic	6.0	4.3	5.7	6.3	5.7	6.0	7.3	5.9	7.0	6.7	7.0	9.0	6.3
Baron	2.0	4.7	5.3	6.0	6.7	6.3	6.0	5.8	7.0	4.0	7.0	7.7	6.7
Bayside	4.0	5.3	6.3	6.0	5.3	5.7	6.3	5.8	6.3	4.7	6.0	6.7	7.0
Cheri	2.7	4.7	6.0	6.3	6.7	5.3	6.0	5.8	6.7	4.0	7.0	7.7	7.0
Parade	5.3	5.7	6.3	6.3	5.7	5.0	6.0	5.8	6.7	4.7	4.3	6.3	7.0
PSU-190	1.0	4.7	6.3	6.7	6.7	6.0	4.7	5.8	6.3	3.3	5.0	6.3	7.3
Glade	2.0	5.0	6.0	6.3	6.7	5.3	5.3	5.8	6.3	3.7	6.3	8.3	7.0
Holiday	5.0	4.7	6.7	5.7	5.3	6.0	6.0	5.7	6.0	5.3	7.0	7.0	6.3
Merion	3.3	5.0	7.0	6.0	5.3	5.3	5.7	5.7	6.0	4.0	5.3	6.0	6.7
1528T	1.3	3.7	5.0	5.7	7.0	6.3	6.3	5.7	6.3	6.0	7.0	9.0	5.3
Charlotte	2.0	4.7	6.0	7.0	6.0	5.0	5.0	5.6	7.0	4.3	5.0	7.3	7.3
Argyle	4.3	5.3	5.7	5.7	6.0	4.7	6.0	5.6	5.3	4.3	4.3	6.3	6.7
Aspen	5.3	5.3	5.0	5.7	5.3	6.0	5.7	5.5	5.3	6.0	6.0	7.3	6.3
NJ 735	2.3	5.0	6.0	6.0	5.3	5.3	5.3	5.5	4.7	4.3	6.0	5.7	6.7
Vantage	3.3	6.3	6.3	5.3	5.3	4.3	5.3	5.5	6.7	2.7	2.7	5.3	6.3
BA-61-91	1.3	4.0	5.0	5.0	6.3	6.3	6.0	5.4	6.7	4.3	6.7	7.7	5.7
MER PP 300	1.0	4.7	5.0	5.3	6.0	5.7	6.0	5.4	7.3	4.0	6.3	8.0	7.0
Merit	1.0	4.0	5.0	5.7	5.7	5.7	6.3	5.4	6.7	4.7	7.3	7.7	5.7
Victa	1.3	4.0	5.0	5.3	6.0	5.7	6.3	5.4	7.0	4.3	7.0	7.7	5.7
Enoble	1.0	4.3	5.7	6.3	5.7	4.7	5.0	5.3	5.7	3.7	5.3	7.0	7.0
MER PP 43	6.0	4.7	5.7	5.7	5.3	4.7	5.7	5.3	6.0	5.3	3.7	6.3	6.3

(continued)

Table 1. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Urbana.[1] (continued)

Cultivar	Spring[2] Greenup 3/16	Quality[3] 4/22	5/18	6/18	7/20	8/18	10/12	All Dates[4] 1982	Leaf[5] Spot 6/12	Dollar[5] Spot 9/16	Mowing[6] Quality 6/1	Color[7] 6/24	Density[8] 6/24
Nugget	1.3	3.3	5.3	6.3	6.3	4.3	6.0	5.3	7.7	2.3	6.3	7.7	7.7
Apart	3.0	4.0	5.0	6.7	5.7	4.3	5.7	5.2	7.0	6.3	5.7	6.3	7.3
Geronimo	1.3	5.0	6.0	5.7	5.7	4.0	5.0	5.2	6.3	3.0	6.0	7.3	6.3
243	7.0	4.7	5.7	5.0	5.0	5.3	5.3	5.2	6.3	6.7	7.0	7.0	5.0
Harmony	4.7	3.7	5.7	6.0	5.7	5.3	4.3	5.1	6.0	3.3	6.0	6.3	6.7
S-21	5.7	5.7	5.7	4.7	5.3	4.0	5.0	5.0	7.0	4.3	3.0	5.3	6.3
Dormie	3.3	4.0	3.7	5.3	6.0	4.0	5.0	4.7	6.7	3.7	5.3	7.0	6.3
Kenblue	1.7	4.0	3.7	4.7	5.0	4.7	6.0	4.7	5.3	3.7	2.7	6.0	5.0
S. D. Common	3.0	4.7	4.7	4.3	5.0	4.0	4.3	4.5	4.7	3.3	3.0	5.0	5.7

[1]All values represent the mean of 3 replications.

[2]Spring greenup evaluations are made on a 1-9 scale where 9 = very dark turf color and 1 = dormant turfgrass.

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

[4]Values represent the mean of 18 scores obtained from 3 replications and 6 evaluation dates.

[5]Disease evaluations are made on a 1-9 scale, where 9 = no disease visible and 1 = complete necrosis.

[6]Mowing quality evaluations made 1 day following mowing with a reel mower are based on a 1-9 scale where 9 = excellent mowing quality, no injury to the turfgrass as a result of mowing and 1 = poor mowing quality, the turfgrass plant was seriously injured by mowing.

[7]Color evaluations are made on a 1-9 scale, where 9 = very dark green and 1 = straw colored.

[8]Density evaluations are made on a 1-9 scale, where 9 = very dense turf and 10 = very low turfgrass density.

Table 2. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Kilbourne[1]

Cultivar	Spring Greenup[2] 4/20	Quality[3] 4/28	6/9	7/19	8/27	10/6	All Dates[4] 1982	Drouth Recovery[5] 7/15	Density[6] 6/9
A-34	6.0	4.7	5.7	4.0	7.0	4.7	5.2	3.7	6.3
Adelphi	7.0	4.7	6.0	3.7	7.0	5.0	5.3	4.3	7.0
Admiral	6.7	5.0	5.0	5.7	7.0	5.7	5.7	6.0	6.7
America	6.3	4.3	6.3	5.3	7.3	4.7	5.6	5.0	6.3
Apart	6.3	4.3	4.3	4.0	6.0	5.0	4.7	4.0	5.7
Argyle	5.3	4.7	5.0	3.3	5.0	3.0	4.2	3.0	6.3
Aspen	7.0	4.7	5.7	4.7	6.7	5.0	5.3	5.7	6.0
A20	6.3	3.3	4.0	4.0	6.7	4.7	4.5	4.3	5.7
A20-6	6.3	4.0	5.7	5.0	7.0	5.3	5.4	5.0	7.0
A20-6A	6.0	4.7	5.3	4.7	6.7	5.7	5.4	4.7	6.0
BA-61-91	7.0	3.7	5.0	5.0	7.3	4.7	5.1	5.0	5.0
Banff	6.0	5.7	5.7	4.3	7.3	6.0	5.8	5.0	7.0
Barblue	6.3	5.3	5.3	2.7	3.7	3.0	4.0	1.7	6.0
Baron	7.0	4.0	4.7	5.0	7.0	5.0	5.1	4.3	5.3
Bayside	7.3	5.0	5.0	4.3	7.0	5.0	5.3	3.7	6.3
Birka	6.7	4.0	5.7	4.7	7.3	5.3	5.4	3.3	6.7
Bonnieblue	6.7	4.3	5.3	5.3	7.3	5.7	5.6	5.0	5.3
Bono	7.0	4.0	5.3	4.7	7.0	4.3	5.1	4.7	7.0
Bristol	7.0	4.0	5.0	6.0	6.0	5.7	5.3	7.0	5.3
CEB VB 3965	7.0	3.7	4.7	4.0	6.3	5.3	4.8	5.3	5.7
Cello	7.0	3.7	4.0	4.7	6.3	4.7	4.7	6.0	5.0
Charlotte	5.7	5.0	5.0	2.7	5.7	3.0	4.3	1.0	6.7
Cheri	6.3	4.7	5.7	4.7	7.7	5.7	5.7	5.0	6.7
Columbia	6.3	5.3	5.3	4.0	6.0	5.0	5.1	4.7	6.3
Dormie	7.0	4.0	4.7	4.0	6.7	4.3	4.7	3.7	5.0

(continued)

Table 2. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Kilbourne[1] (continued)

Cultivar	Spring[2] Greenup	Quality[3]					All Dates[4]	Drouth Recovery[5]	Density[6]
	4/20	4/28	6/9	7/19	8/27	10/6	1982	7/15	6/9
Eclipse	6.7	4.0	5.0	4.7	6.3	4.3	4.9	4.3	6.3
Enmundie	7.0	4.3	6.0	6.3	6.7	5.7	5.8	5.7	6.7
Enoble	6.7	4.7	6.0	4.7	7.0	5.3	5.5	3.7	7.3
Escort	6.7	5.3	5.0	4.3	6.7	5.3	5.3	3.7	6.0
Fylking	6.7	5.3	5.7	2.7	6.0	4.0	4.7	1.7	7.7
Geronimo	7.0	4.7	5.3	4.0	6.0	4.0	4.8	4.0	7.0
Glade	6.3	4.3	5.7	4.0	7.7	5.0	5.3	3.3	6.7
H-7	6.0	4.0	5.0	5.7	6.0	5.0	5.1	5.7	6.0
Harmony	6.3	4.3	5.3	3.7	6.7	4.7	4.9	3.7	6.0
Holiday	6.3	4.0	5.7	4.3	6.7	4.3	5.0	4.3	7.0
I-13	6.0	4.0	5.3	4.7	7.0	5.0	5.2	4.3	6.7
Kenblue	5.3	4.3	4.0	2.3	6.7	2.7	4.0	1.0	4.0
Kimono	6.0	4.0	6.0	5.0	7.3	5.7	5.6	5.3	7.0
K1-152	6.3	5.7	5.7	5.7	6.7	6.0	5.9	6.3	7.0
K3-162	6.3	5.0	4.7	2.3	4.3	3.3	3.9	1.0	5.7
K3-178	6.3	5.3	5.3	4.7	7.0	5.3	5.5	5.0	6.3
K3-179	6.7	4.3	5.3	3.3	5.7	4.3	4.6	3.7	6.3
Lovegreen	6.0	4.3	5.3	3.0	5.3	4.3	4.5	2.0	7.0
Majestic	7.0	5.3	5.3	4.7	7.0	4.7	5.4	4.0	6.3
MER PP 300	6.7	4.0	5.0	4.3	6.3	4.3	4.8	4.3	5.7
MER PP 43	6.7	4.0	5.3	4.0	5.3	3.7	4.5	3.0	6.0
Merion	6.0	4.3	5.0	4.7	6.7	4.7	5.1	5.0	6.0
Merit	7.0	4.7	5.3	6.3	7.7	5.7	5.9	5.7	6.7
MLM-18011	7.0	4.3	5.7	4.3	6.0	5.3	5.1	4.7	5.7
Mona	6.0	5.3	5.7	5.0	8.0	5.7	5.9	5.3	6.3

(continued)

Table 2. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Kilbourne[1]

Cultivar	Spring[2] Greenup	Quality[3]					All Dates[4]	Drouth Recovery[5]	Density[6]
	4/20	4/28	6/9	7/19	8/27	10/6	1982	7/15	6/9
Monopoly	6.7	4.7	5.7	5.0	6.7	5.3	5.5	4.7	6.3
Mosa	7.0	4.7	6.0	4.3	6.3	4.7	5.2	3.7	7.0
NJ 735	6.3	4.3	4.7	4.3	6.7	5.0	5.0	5.0	6.0
Nugget	7.0	3.0	4.3	4.3	6.3	5.0	4.6	4.7	5.3
N535	6.3	4.7	5.0	4.3	7.0	4.7	5.1	4.7	5.7
Parade	6.3	5.0	5.7	4.3	6.7	5.0	5.3	4.3	5.3
Piedmont	6.0	4.0	4.7	4.3	6.7	5.0	4.9	4.0	5.3
Plush	6.7	4.7	6.0	4.7	6.3	5.0	5.3	4.7	7.3
PSU-150	6.3	4.7	6.3	5.0	6.7	4.7	5.5	4.0	6.7
PSU-173	7.3	4.7	6.3	4.7	7.0	5.0	5.5	4.3	7.7
PSU-190	6.0	4.7	5.0	4.0	6.7	4.7	5.0	4.0	5.3
P141 (Mystic)	6.0	3.0	4.7	4.3	6.7	4.3	4.6	4.7	5.7
RAM 1	6.7	4.7	5.3	4.3	6.7	4.7	5.1	3.3	5.7
Rugby	6.3	5.0	6.0	3.7	6.7	4.0	5.1	2.7	7.7
S. D. Common	6.0	4.7	4.0	2.7	4.0	3.7	3.8	2.3	5.0
S-21	5.3	4.7	4.3	4.0	6.0	3.7	4.5	3.3	5.3
SH-2	6.7	4.0	4.7	5.3	6.7	6.0	5.3	6.0	5.7
Shasta	7.0	4.0	4.7	4.3	6.3	5.0	4.9	5.0	5.3
SV-01617	6.3	4.7	5.7	3.7	6.7	4.7	5.1	2.7	6.7
Sysdport	6.7	5.3	6.3	5.7	7.7	5.7	6.1	6.0	7.7
Touchdown	6.7	4.7	5.0	5.7	8.0	5.7	5.8	5.7	6.3
Trenton	6.7	6.0	5.7	5.3	6.3	5.7	5.8	5.3	7.0
Vanessa	6.7	4.7	6.0	4.3	7.0	5.0	5.4	4.0	7.3
Vantage	5.0	4.0	3.7	3.3	5.3	4.0	4.1	3.0	5.0
Victa	7.0	3.7	4.3	4.0	6.7	4.7	4.7	5.0	4.7

(continued)

Table 2. Evaluation of Kentucky bluegrass varieties during the 1982 growing season - Kilbourne[1] (continued)

Cultivar	Spring Greenup[2] 4/20	Quality[3] 4/28	6/9	7/19	8/27	10/6	All Dates[4] 1982	Drouth Recovery[5] 7/15	Density[6] 6/9
Wabash	5.3	5.7	5.7	3.3	6.7	5.0	5.3	3.3	6.7
Welcome	6.0	4.7	6.0	4.0	7.0	4.7	5.3	3.0	7.0
WW AG 463	6.3	5.7	5.7	4.0	6.3	5.0	5.3	4.0	7.0
WW AG 478	6.7	3.3	6.3	3.3	4.7	3.0	4.1	2.0	8.0
WW AG 480	6.7	3.7	5.0	4.0	7.3	5.0	5.0	3.7	7.0
1528T	8.0	4.0	6.3	5.7	6.3	5.3	5.5	5.3	6.0
225	6.3	5.0	5.7	5.0	7.7	5.7	5.8	5.3	6.3
239	6.0	5.0	5.3	5.7	7.7	5.3	5.8	5.7	6.0
243	7.3	4.0	4.7	5.7	6.7	5.7	5.3	7.3	4.7

[1]All values represent the mean of 3 replications.

[2]Spring greenup evaluations are made on a 1-9 scale, where 9 = excellent spring color and 1 = very poor spring color.

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

[4]Values represent the mean of 15 scores obtained from 3 replications and 5 evaluation dates.

[5]Drouth recovery evaluations are made on a 1-9 scale where 9 = complete recovery from severe drouth, no stress noticed and 1 = 100% dormancy.

[6]Density evaluations are made on a 1-9 scale where 9 = very dense turf and 1 = very low turf density.

KENTUCKY BLUEGRASS BLEND EVALUATION

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

The intraspecific variability of Kentucky bluegrass has allowed selection of cultivars that differ widely in their color, texture, density, and environmental adaptation. The use of a blend, the combination of two or more cultivars of the same species, provides even greater genetic variability than the use of a single cultivar. Blending reduces the possibility of severe damage due to a disease and improves the general adaptation of the turf under differing environmental conditions. Blending superior varieties allows the desired features of each component to be incorporated while reducing the effects of specific weaknesses on general turfgrass quality.

The purpose of this study is to examine the quality of several Kentucky bluegrass cultivars alone and blended 1:1 with one other cultivar. There are 20 cultivars alone or in combination. They include:

Adelphi	Touchdown-Adelphi	
Majestic	Majestic-Brunswick	
Merion	Merion-Brunswick	
Ram #1	Merion-Majestic	
Brunswick	Baron-Majestic	
Baron	Baron-Brunswick	
Touchdown		
Columbia	Experimental Varieties:	
Majestic-Touchdown	BFC-46-1	P-1528T
	BFB-35-1	

Plots were established August 24, 1978 and are 5 ft x 6 ft with each cultivar or blend replicated 6 times. The turf is mowed 2-3 times per week at 1.5 inches. Fertilizer is applied 3 times per year at 1 lb. N/1000 sq. ft. Plots are irrigated as needed to prevent wilt.

In general cultivar and blend performance remained fair to good throughout the growing season. Turfgrass quality was especially high in late June. The beneficial effects of blending can be observed in quality evaluations over all dates (Table 3). The Touchdown/Adelphi blend was superior to Touchdown alone. In July the Touchdown/Adelphi blend was superior to either Adelphi or Touchdown alone. The addition of Brunswick to Adelphi increased the quality above Adelphi used alone. Generally, plots containing the cultivar Merion alone or blended had poor quality. However, the August evaluation shows the Merion/Brunswick blend to have improved quality compared with the turfgrass quality of Merion alone.

Table 3. Kentucky bluegrass cultivar and cultivar blend evaluation.[1]

Cultivar	Quality[2] 3/16	4/23	5/18	6/22	7/21	8/17	10/14	All Dates 1982
Adelphi	6.3bc	7.2ab	7.3ab	8.8ab	6.3f-i	6.5c-f	6.8a-c	7.0a-d
Majestic	6.5bc	6.3a-e	7.0a-c	7.8ef	6.2g-i	6.0ef	6.7a-c	6.6d-g
Merion	5.8bc	5.7e-g	6.2c-e	7.7f	6.0hi	5.8f	6.0cd	6.2h
Ram #1	6.7ab	6.8a-d	7.3ab	9.0a	7.3a-c	6.3d-f	5.5d	7.0a-e
Brunswick	6.0bc	6.8a-d	6.3b-e	8.5a-d	6.2g-i	6.7b-e	6.8a-c	6.8b-g
Baron	5.7c	5.3e-g	6.2c-e	8.3b-e	7.2b-d	6.8b-d	6.8a-c	6.6d-h
Touchdown	5.7c	5.8d-g	6.2c-e	8.7a-c	6.5e-h	6.7b-e	6.2b-d	6.5f-h
Columbia	7.5a	7.3a	7.2a-c	7.8ef	5.8i	6.2d-f	6.2b-d	6.8a-g
Majestic/Touchdown	6.3bc	6.2b-f	6.7a-d	8.8ab	6.7d-g	6.3d-f	6.7a-c	6.8a-g
Majestic/Adelphi	5.7c	6.2b-f	6.3b-e	8.7a-c	6.7d-g	6.5c-f	6.5b-c	6.6d-g
Brunswick/Adelphi	6.5bc	7.0a-c	6.8a-d	8.5a-d	7.0b-e	7.2a-c	6.8a-c	7.1a-c
Touchdown/Adelphi	6.2bc	7.0a-c	7.5a	8.8ab	7.8a	6.5c-f	7.0ab	7.3a
Majestic/Brunswick	6.7ab	6.8a-d	6.8a-d	8.2c-f	6.5e-h	6.5c-f	7.0ab	6.9a-f
Merion/Brunswick	5.7c	5.7e-g	6.3b-e	8.2c-f	6.3f-i	6.8b-d	6.8a-c	6.5e-h
Merion/Majestic	6.5bc	6.3c-f	6.7a-d	7.7f	6.0hi	6.2d-f	6.8a-c	6.6d-h
Baron/Majestic	5.7c	5.5e-g	6.3b-e	8.0d-f	6.3f-i	6.5c-f	6.8a-c	5.4g-h
Baron/Brunswick	5.7c	5.2f-g	5.8de	8.5a-d	6.8c-f	6.8b-d	6.7a-c	6.5f-h
BFC-46-1	6.2bc	6.0c-f	6.2c-e	8.2c-f	6.5e-h	6.5c-f	6.2b-d	6.5f-h
BFB-35-1	6.3bc	6.3a-e	6.5a-d	8.8ab	7.3a-c	7.7a	7.5a	7.2ab
P-1528T	6.0bc	4.8g	5.3e	8.5a-d	7.5ab	7.3ab	7.5a	6.7c-g

[1]All values represent the mean of 6 replications. Means with the same letter are not significantly different at the 0.05 level as determined by Fisher's Least Significant Difference test.

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

[3]Values represent the mean of 42 scores obtained from 6 replications and 7 evaluation dates.

REGIONAL CULTIVAR EVALUATIONS

J. E. Haley and T. W. Fermanian

Turfgrass cultivar recommendations in Illinois are generally made from data obtained from turfgrass evaluation trials at the Urbana or Kilbourne research facilities. However, Illinois is a state over 400 miles long, with a wide range of temperatures, precipitation and soil conditions. A cultivar suited to central Illinois may not be suited to northern or southern Illinois. With this in mind, cultivar evaluation trials were established in Rock Island County, September 10, 1981 and in DuPage County, September 23, 1981. Cultivars established at these sites are as follows:

Kentucky bluegrass

Adelphi	Sydsport
Parade	Victa
Aspen	Bonnieblue
Rugy	Shasta
Columbia	Touchdown
WTN-A-34	Mystic
WTN-A20	America
WTN-H7	Haga
WTN-I13	Baron
	Ram I

Perennial Ryegrass

Pennant	Loretta
Premier	Yorktown II
Manhattan	Diplomat
Lesco's CBS Blend	Fiesta
Goalie	Blazer
Pennfine	Dasher

Tall Fescue

Shannon
Falcon
Olympic
K31
Rebel
Mustang

Fine Fescue

Scaldis
Biljart
Pennlawn
Waldina
Agram
Jamestown

In Rock Island, Kentucky bluegrass, perennial ryegrass and the improved tall fescues exhibited the best quality (Table 4). The Kentucky bluegrass quality improved steadily over the summer. There was very little difference among the bluegrass varieties at this time. Those cultivars performing exceptionally well in late August were Mystic, Touchdown, Sydsport, America, Vantage, WTN A34, WTN A20 and WTN I13.

Perennial ryegrass quality was generally very good throughout the season with little quality differences among the cultivars. Ryegrass quality was highest during late July. Density was good throughout the season.

Tall fescue quality was fair to good during 1982 with ratings being highest in July. The performance of the cultivars K-31 and Shannon was generally not as high as the other cultivars listed. Density and turf cover with the tall fescue cultivars was fair to good.

In 1982 the performance of the fine leaf fescues was only fair. The cultivar Biljart had the lowest quality and poorest turf cover of those cultivars tested. The poor performance of the fine leaf fescues in this trial may be the result of intense sunlight. This species is adapted best to partial to full shade.

Except for turfgrass cover in April there was no difference among the turfgrass mixes purchased locally. The quality and density of these mixes averaged fair to good throughout the season.

The trial in DuPage County suffered from snow mold damage during the 1981-1982 winter and did not fully recover dring the 1982 growing season. Therefore, quality ratings were lower than anticipated. Quality ratings for all turfgrass species were poor to fair with little difference exhibited among cultivars within a species (Table 5).

At both locations the turfgrass Puccinellia distans (L.) Parl. cv. Fults or weeping alkaligrass exhibited very poor quality. Although its quality is low this grass is salt tolerant and can be used to stabilize areas with a high concentration of salts in the soil. This can be useful along roadways that are salted during the winter.

As the turfgrass plots mature more information will be obtained regarding the differences among turf species and cultivars. This information will help you evaluate which turfgrass is best suited for your location.

Table 4. Regional cultivar evaluation - Rock Island County.[1]

Cultivar	Spring Color[2]	Quality[3]				All Dates[4]	% Cover[5]	Density[6]
	4/20	6/9	7/20	8/27	10/13	1982	4/20	6/9
Kentucky Bluegrass								
Adelphi	7.3	6.0ab	7.3	7.3a-d	8.0	7.2	71.7ab	5.3b-e
America	6.7	6.3a	7.7	7.7a-c	8.3	7.5	70.0a-c	5.3b-e
Aspen	7.3	5.3b-d	7.0	6.7cd	7.3	6.6	70.0a-c	5.0c-e
Baron	7.0	6.0ab	7.3	7.0b-d	7.3	6.9	71.7ab	5.3b-e
Bonnieblue	7.7	5.3b-d	7.7	7.0b-d	8.3	7.1	63.3bc	6.3ab
Columbia	7.0	6.3a	7.7	7.3a-d	7.7	7.2	71.7ab	6.0a-c
Haga	6.7	6.3a	8.0	7.0b-d	7.3	7.2	75.0a	6.7a
Mystic	7.7	6.0ab	8.0	8.3a	6.7	7.2	68.3a-c	5.3b-e
Parade	6.3	6.0ab	7.7	6.3d	7.3	6.8	68.3a-c	6.0a-c
Ram #1	8.0	6.3a	7.7	7.3a-d	8.3	7.4	73.3ab	5.0c-e
Rugby	6.7	6.3	7.3	7.3a-d	7.7	7.2	73.3ab	6.3ab
Shasta	7.3	4.7d	6.7	6.3d	7.7	6.3	60.0cd	4.3e
Sydsport	7.0	5.3b-d	7.0	8.0ab	7.7	7.0	71.7ab	6.0a-c
Touchdown	7.0	6.0ab	8.0	8.3a	8.3	7.7	65.0a-c	5.3b-e
Vantage	6.7	5.0cd	7.7	7.7a-c	7.0	6.8	71.7ab	5.0c-e
Victa	7.0	6.0ab	8.0	7.0b-d	7.3	7.1	65.0a-c	5.7a-d
WTN-A20	7.0	5.7a-c	7.7	7.7a-c	7.7	7.2	68.3a-c	5.3b-e
WTN-A34	6.7	5.7a-c	7.7	8.0ab	7.7	7.2	68.3a-c	5.7a-d
WTN-H7	6.7	4.7d	7.0	6.7cd	8.0	6.6	51.7d	4.7de
WTN-I13	7.0	5.7a-c	7.3	7.7a-c	8.3	7.2	63.3bc	5.3b-e

(continued)

Table 4. Regional cultivar evaluation - Rock Island County.[1] (continued)

Cultivar	Spring Color[2]	Quality[3]				All Dates[4]	% Cover[5]	Density[6]
	4/20	6/9	7/20	8/27	10/13	1982	4/20	6/9
Perennial Ryegrass								
Blazer	6.3a	7.3	8.0	7.0ab	7.0	7.3	91.7	7.7a
Dasher	6.3a	6.7	8.0	7.0ab	7.7	7.3	91.7	7.0b
Diplomat	6.3a	7.0	8.0	7.0ab	6.3	7.1	95.0	8.0a
Fiesta	6.3a	6.7	7.7	6.7a-c	7.0	7.0	95.0	7.0b
Goalie	6.7a	6.7	8.0	6.0cd	6.0	6.7	91.7	7.0b
Lesco's CBS Blend	6.0a	6.7	7.7	7.0ab	6.7	7.0	95.0	6.7b
Loretta	5.0b	7.0	7.7	6.7a-c	7.3	7.2	93.3	7.7a
Manhattan	6.3a	7.0	8.0	5.7d	5.3	6.5	91.7	7.7a
Pennant	6.7a	6.7	8.0	7.0ab	6.7	7.1	93.3	7.0b
Pennfine	6.0a	6.7	8.0	6.3b-d	5.7	6.7	95.0	7.0b
Premier	6.3a	7.0	8.0	7.0ab	7.3	7.3	93.3	7.0b
Yorktown	6.0a	7.0	8.0	7.3a	6.7	7.2	93.3	7.7a
Tall Fescue								
Falcon	6.3	6.0ab	7.0	7.7a	8.0a	7.2a	85.0	6.7
K-31	6.0	4.7c	6.3	6.0b	6.3b	5.8c	80.0	6.0
Mustang	6.7	6.7a	7.3	7.3b	8.3a	7.4a	85.0	7.3
Olympic	6.7	6.3a	7.0	7.7a	8.0a	7.2a	78.3	6.0
Rebel	6.3	5.0bc	6.7	7.7a	8.3a	6.9ab	83.3	6.0
Shannon	6.0	5.0bc	6.7	7.0a	6.7b	6.3bc	65.0	5.3

(continued)

Table 4. Regional cultivar evaluation - Rock Island County.[1] (continued)

Cultivar	Spring Color[2] 4/20	Quality[3] 6/9	Quality[3] 7/20	Quality[3] 8/27	Quality[3] 10/13	All Dates[4] 1982	% Cover[5] 4/20	Density[6] 6/9
Fine Fescue								
Agram	8.0	6.7a	8.0a	4.7	6.3	6.4a	85.0a	5.3a
Biljart	7.7	2.3c	3.7c	3.7	4.0	3.4c	8.3c	3.0c
Jamestown	8.0	6.3a	7.3a	3.3	4.7	5.4ab	81.7a	5.3a
Pennlawn	7.7	5.3ab	7.3a	4.0	5.3	5.5ab	75.0a	4.7ab
Scaldis	8.0	4.0b	5.7b	4.0	5.7	4.8b	27.7b	3.7bc
Waldina	7.3	6.3a	7.0a	4.7	7.0	6.2a	83.3a	5.0a
Local Mixes								
Evergreen Lawn Mix	7.0	5.0	7.3	6.0	6.0	6.1	75.0a	5.3
Fast & Fine NK	7.0	5.0	7.7	6.0	6.0	6.2	66.7ab	5.7
Golf Lawn Seed Mix	6.7	4.7	7.0	6.0	5.3	5.8	56.7b	5.0
Prevail Low Maint.	7.3	5.3	7.3	5.3	5.0	5.8	78.3a	5.3
Teske's Seed	6.7	5.3	8.0	7.0	7.0	6.8	76.7a	6.3

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

[2]Spring greenup evaluations are made on a 1-9 scale, where 9 = early spring greenup and 1 = complete dormancy.

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

[4]Values represent the mean of 12 scores obtained from 3 replications and 4 evaluation dates.

[5]Percent cover evaluations are made on a 0-100 scale, where 100 = complete cover of the plot with turf and 0 = no turf present.

[6]Density evaluations are made on a 1-9 scale where 9 = very dense turf and 1 = very low turfgrass density.

Table 5. Regional cultivar evaluation - DuPage County.[1]

Cultivar	Spring Color[2]	Quality[3]				All Dates[4]	% Cover[5]		Snow Mold[6]
	4/20	6/9	7/20	8/27	10/13	1982	4/20	6/9	4/30
Kentucky Bluegrass									
Adelphi	4.7a-d	3.0	5.3	4.0cd	4.7	4.2	27.7d-f	38.3d-f	8.0
America	4.7a-d	3.7	5.3	3.7d	4.7	4.3	40.0a-c	40.0c-f	9.0
Aspen	5.0a-c	3.3	4.3	4.3b-d	4.0	4.0	31.7c-e	36.7ef	9.0
Baron	5.3ab	3.3	5.7	5.7a	5.3	5.0	37.7a-e	38.3d-f	7.0
Bonnieblue	5.0a-c	4.3	5.3	5.3ab	6.0	5.2	48.3a	57.7a	8.7
Columbia	4.3b-d	4.0	5.7	5.3ab	6.0	5.2	41.7a-c	45.0a-f	8.3
Haga	3.7d	4.0	5.7	5.0a-c	5.0	4.9	45.0ab	57.7a	9.0
Merit	5.7a	2.7	5.0	5.7a	5.0	4.6	18.3f	31.7f	6.3
Mystic	4.0cd	4.0	5.7	5.0a-c	5.3	5.0	40.0a-c	55.0ab	9.0
Parade	3.7d	4.0	5.0	5.3ab	6.3	5.2	41.7a-c	57.7a	9.0
Ram #1	4.7a-d	4.0	5.3	4.7a-d	6.7	5.2	45.0ab	51.7a-d	8.0
Rugby	4.0cd	3.7	4.7	4.3b-d	5.0	4.4	40.0a-c	51.7a-d	7.7
Shasta	4.7a-d	3.7	5.7	5.3ab	5.0	4.9	41.7a-c	55.0ab	8.3
Sydsport	4.0cd	3.7	5.3	5.0a-c	5.0	4.8	33.3b-d	47.7a-e	8.0
Touchdown	5.3ab	4.0	5.0	4.7a-d	5.7	4.8	43.3a-c	55.3a-c	8.7
Vantage	5.3ab	3.3	5.3	5.3ab	5.0	4.8	25.0ef	41.7b-f	6.3
Victa	5.3ab	3.3	5.3	5.3ab	5.7	4.9	40.0a-c	40.0c-f	7.3
WTN-A20	4.7a-d	3.3	5.0	5.3ab	5.3	4.8	31.7c-e	53.3a-c	6.3
WTN-A34	5.3ab	4.0	5.3	5.7a	5.7	5.2	33.3b-e	50.0a-e	5.0
WTN-H7	3.7d	3.3	4.3	4.7a-d	5.0	4.3	35.0b-e	40.0c-f	4.0
WTN-I13	4.3b-d	3.7	5.0	5.3ab	5.3	4.8	38.3a-d	55.0ab	9.0

(continued)

Table 5. Regional cultivar evaluation - DuPage County.[1] (continued)

Cultivar	Spring Color[2]	Quality[3]				All Dates[4]	% Cover[5]		Snow Mold[6]
	4/20	6/9	7/20	8/27	10/13	1982	4/20	6/9	4/30
Perennial Ryegrass									
Blazer	4.3	5.7	5.0	3.7	4.3	4.7a	61.7	83.3	8.0
Dasher	4.0	3.3	3.3	3.0	3.7	3.3bc	38.3	47.7	7.7
Diplomat	4.3	3.7	3.7	2.7	3.0	3.2c	40.0	58.3	6.0
Fiesta	4.7	4.0	4.0	3.7	5.3	4.2a	40.0	60.0	5.0
Goalie	4.3	4.3	3.7	3.3	4.3	3.9a-c	48.3	65.0	7.3
Lescos's CBS Blend	4.3	4.0	4.0	3.3	5.3	4.2ab	47.7	61.7	7.7
Loretta	4.0	4.7	4.7	4.3	5.3	4.8a	45.0	65.0	8.3
Manhattan	4.3	6.0	4.3	3.3	3.7	4.3a	65.0	86.7	8.3
Pennant	4.3	5.0	4.3	3.7	4.7	4.4a	51.7	73.3	8.3
Pennfine	4.0	4.7	4.3	3.3	4.7	4.2a	51.7	61.7	6.7
Premier	4.3	4.0	3.7	3.7	5.0	4.1a-c	40.0	53.3	6.3
Yorktown	4.0	4.0	4.3	3.7	4.0	4.0a-c	45.0	68.3	7.0
Tall Fescue									
Falcon	4.3ab	5.3	6.3	5.0	4.7	5.3	60.0	78.3	8.3
K-31	3.3b	5.7	5.7	5.0	5.0	5.3	66.7	80.0	8.0
Mustang	---	---	---	---	2.0	---	---	---	---
Olympic	5.0a	5.0	5.7	4.3	5.0	5.0	45.0	70.0	7.3
Rebel	5.0a	5.7	6.0	5.3	5.3	5.6	60.0	86.7	7.7
Shannon	4.3ab	5.7	5.3	4.7	4.7	5.1	53.3	71.7	7.0
Fine Fescue									
Agram	6.3ab	5.3b	5.7a	3.0b	3.7b	4.4b	41.7b	55.0bc	7.0
Biljart	7.0a	2.3d	3.7b	2.7b	4.7b	3.3c	6.7c	21.7d	6.3
Jamestown	6.3ab	6.0ab	6.3a	3.7ab	4.3b	5.1ab	65.0a	71.7ab	7.3
Pennlawn	5.7b	6.3a	5.7a	3.3b	4.0b	4.8ab	56.7a	88.3a	8.7
Scaldis	7.0a	4.3c	5.3a	3.0b	4.7b	4.3b	13.3c	43.3c	6.3
Waldina	5.7b	5.7ab	6.3a	4.7a	6.0a	5.7a	56.7a	70.0b	7.3

(continued)

Table 5. Regional cultivar evaluation - DuPage County.[1] (continued)

Cultivar	Spring Color[2] 4/20	Quality[3] 6/9	Quality[3] 7/20	Quality[3] 8/27	Quality[3] 10/13	All Dates[4] 1982	% Cover[5] 4/20	% Cover[5] 6/9	Snow Mold[6] 4/30
Mixes									
Adelphi-Pennfine	4.3	3.0	5.3	4.3	4.3	4.2	31.7	45.0	4.3
Baron-Pennfine	5.3	3.7	5.3	4.0	4.3	4.3	36.7	58.3	6.0
Victa-Yorktown	5.7	3.0	4.7	4.3	4.0	4.0	26.7	33.3	2.3
Columbia-Manhattan	4.7	4.7	4.3	4.0	4.3	4.3	40.0	65.0	8.7

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

[2]Spring color evaluations are made on a 1-9 scale where 9 = very dark green and 1 = straw.

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

[4]Values represent the mean of 12 scores obtained from 3 replications and 4 evaluation dates.

[5]Percent cover evaluations are made on a 0-100 scale where 100 = complete cover of the plot with turf and 0 = no turf present.

[6]Snow mold evaluations are made on a 1-9 scale where 9 = no visible evidence that the turf was infected with snow mold and 1 = complete necrosis.

PERENNIAL RYEGRASS CULTIVAR EVALUATION

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

In the past, perennial ryegrass has usually been considered a temporary lawn or nursegrass in seed mixtures. In Illinois, deterioration during the summer months has prevented perennial ryegrass from becoming an important permanent turfgrass. Improved varieties with better color, density, mowing quality, and disease resistance have challenged the traditional image of perennial ryegrass.

Plots of 14 perennial ryegrass cultivars were established August 24, 1978. Plots measured 5 x 6 ft and each cultivar was replicated 3 times. Plots are mowed at 1.5 in., fertilized 3 times per year with 1 lb N/1000 square feet per application and are irrigated as needed to prevent wilt. The following cultivars were established in our trials:

Loretta	Yorktown
Citation	Derby
Manhattan	Pennfine
Omega	Regal
Birdie	Blazer
Caravelle	Fiesta
CBS M-16-7-78	M-456

In general ryegrass quality in 1982 was reduced from the 1981 growing season. Turfgrass quality from April through June was high but quality deteriorated in July and remained low through September (Table 6). Cultivars performing well throughout the season were Loretta, Yorktown, Derby, Blazer and the experimental cultivar M-456. Caravelle did not perform well at the Urbana test plot. During the summer months mowing quality was poor for all varieties.

The University of Illinois is participating in a USDA national perennial ryegrass test. The Urbana trial, established September 8, 1982, included 50 perennial ryegrass cultivars, some that are experimental and others that are commercially available (Table 7). Over a period of several years we hope to obtain monthly ratings from this trial evaluating quality, disease resistance and tolerance to environmental stress. Based on this information recommendations can be made on the best perennial ryegrass cultivars available for use in central Illinois.

Table 6. Evaluation of the quality of perennial ryegrass varieties during the 1982 growing season.[1]

	Quality[2]						All Dates[3]
Cultivar	4/22	5/19	6/14	7/20	8/17	9/28	1982
Loretta	7.3a-c	8.0ab	8.7ab	6.7a	7.0a	6.0a	7.3a
M-456	7.0bc	8.7a	9.0a	6.0ab	6.7a	5.3a	7.1ab
Yorktown	7.0bc	7.7bc	8.0b-d	5.7a-c	6.3a	5.7a	6.7a-c
Derby	7.3a-c	6.3d-e	7.0e-g	6.7a	7.3a	4.7a	6.6a-c
Blazer	7.0bc	7.7bc	8.3a-c	5.7a-c	7.0a	4.7a	6.5ac
Pennfine	7.7ab	6.0ef	7.0e-g	5.7a-c	7.0a	4.7a	6.3bc
Fiesta	7.7ab	7.3bc	7.3d-f	4.7c-f	6.0a	4.7a	6.3bc
CBS-M-16-7-78	8.0a	7.0cd	6.7fh	5.0b-e	6.0a	4.7a	6.2c
Citation	7.3a-c	7.3bc	6.0h	5.3b-d	6.3a	5.0a	6.2c
Manhattan	7.0bc	7.7bc	7.7c-e	4.3d-f	5.7a	4.3a	6.1c
Birdie	7.7ab	7.0cd	6.3gh	4.7c-f	5.7a	4.7a	6.0c
Omega	7.0bc	7.3bc	7.0e-g	4.0ef	6.3a	4.3a	6.0c
Regal	6.7c	7.0cd	7.0e-g	5.0b-e	6.0a	4.0a	5.9c
Caravelle	5.0d	5.3f	6.3gh	3.7f	4.3a	4.3a	4.8d

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

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

[3]Values represent the mean of 18 scores obtained from 3 replications and 6 evaluations dated.

Table 7. USDA national perennial ryegrass trial.

Cultivar	Cultivar
Palmer	Omega
Diplomat	2ED
Prelude	NK 80389
Barry	NK 79309
Yorktown II	Pennant
LP 736	Premier
LP 702	SWRC-1
Crown	M382
LP 210	HR-1
Acclaim	Linn
HE178	Pennfine
HE168	Delray
Ranger	NK 79307
Blazer	Cupido
Fiesta	Regal
Dasher	Derby
LP 792	IA 728
WWE 19	Elka
Cockade	Gator
Cigil	BT-I
2EE	GT-II
Manhattan	Pippin
Manhattan II	Fiesta/Manhattan II*
282	Prelude/Blazer*
Citation	Manhattan II/Blazer*

*A 50/50 blend by weight of the cultivars listed.

TALL FESCUE CULTIVAR EVALUATION UNDER TWO MAINTENANCE LEVELS

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

In Illinois, tall fescue (Festuca arundinacea) is primarily used on low maintenance sites like roadways and playgrounds. Tall fescue has excellent heat, drought and wear tolerance but a course texture prevents its use in areas where a high quality turf is needed and a bunch type growth habit prevents its use in mixtures with other turf species. The susceptibility of tall fescue to low temperature injury reduces its use outside the transition zone. Improved "turf" type tall fescue cultivars with finer texture and improved cold tolerance have recently been introduced.

In order to examine the performance of these "turf" type tall fescue cultivars an evaluation trial was established in Urbana, September 20, 1982. The trial contains 22 "turf" type tall fescue cultivars (experimental and commercially available), one "forage" type (K31), five tall fescue-Kentucky bluegrass mixes, two tall fescue-perennial ryegrass mixes and one tall fescue blend (Table 8). Plot size is 5 x 6 feet and each cultivar is replicated three times. The trial is duplicated in order to evaluate the cultivars at two levels of cultural maintenance. Under maintenance level I the turf will not be irrigated. It will be fertilized only once in the fall with 1 lb N/1000 sq ft. Under maintenance level II the turf will be irrigated and will be fertilized four times per year with 1 lb N/1000 sq ft. All turf will be maintained at 2.5 inch height of cut. Over the years we hope to obtain information about the cultivars' quality, disease resistance and resistance to environmental stress.

Table 8. Tall fescue cultivar evaluation.

Cultivar	Mixes
K 82142	Olympic + 10% PST 483 Kentucky bluegrass
K 79628	Olympic + 5% PST 483 Kentucky bluegrass
SYN GA	Rebel + 10% Newport Kentucky bluegrass
BEL SYN 22	Rebel + 10% Baron Kentucky bluegrass
Galway	Rebel + 10% Bonnieblue Kentucky bluegrass
NK 81452	Rebel + 50% Blazer perennial rye
NK 81453	Rebel + 50% Fiesta perennial rye
Marathon	
Houndog	**Blend**
TF805	
Brookston	Clemfine/Olympic
ISI BK 2	
Mustang	
Jaguar	
5 M4-82	
Olympic	
52 H	
52 W	
Rebel	
Clemfine	
Barcel	
Falcon	
K-31	

BENTGRASS BLENDS FOR PUTTING GREEN TURF

D. J. Wehner and J. E. Haley

There are advantages and disadvantages associated with using vegetatively propagated bentgrass selections for putting green turf. The main advantage is that the putting green will be very uniform since every plant is genetically identical to every other plant. The main disadvantage is that any factor which affects the given cultivar can affect the entire green. Disease outbreaks have the potential of being more severe on vegetatively propagated areas because the susceptability of all plants is basically the same. Seeded bentgrass cultivars offer an advantage over vegetative strains in that they are genetically more diverse. A seeded variety may be composed of several different individuals which possess agronomically similar characteristics.

Blending two or more bentgrass varieties to gain genetic diversity is a sound principle in theory. Problems may arise however because the two varieties may not have similar enough growth rates or morphological characteristics. Past attempts to blend vegetatively propagated bentgrass varieties have not always been successful. Swirling or excessive grain has sometimes occurred on these areas. After seeing severely damaged Toronto greens it was felt that an evaluation of blends of seeded bentgrass cultivars would be worthwhile. This would be an attempt to produce a quality putting surface and at the same time increase the genetic diversity of the stand.

All possible two-way blends of the cultivars Penncross, Penneagle, Seaside, and Emerald were established at the Ornamental Horticulture Research Center in Urbana August 21, 1981. Each blend and the four individual components were established in 6 x 10 ft. plots with three replications. The turf is maintained at a 0.25 inch height of cut and irrigated as necessary to prevent wilt. During the 1982 growing season the turf was fertilized with 5 lb N/1000 sq ft and the area was topdressed frequently to level the surface.

There was no difference in rate of establishment among the components and blends. In 1982 turfgrass quality was highest in plots containing Penneagle, alone or in a blend (Table 9). The cultivars Seaside and Emerald performed poorly throughout the season. At this time no cultivar segregation is apparant in the blends; however, plots will be evaluated over several years to see if any segregation occurs.

Table 9. Evaluation of creeping bentgrass cultivars and blends for the 1982 growing season.[1]

	Quality[2]									
Cultivar	3/16	5/18	6/22	7/20	8/17	9/16	10/21	All Dates[3] 1982	Snow Mold[4]	Dollar Spot[4]
Penneagle	6.0a	6.3a	7.3a	7.3a	6.3a	8.0a	6.0a	6.8a	6.0a	6.0ab
Penncross-Penneagle	5.3a	6.0ab	7.0a	6.7ab	6.0ab	8.0a	5.3a-c	6.3ab	5.7a	6.0ab
Penneagle-Emerald	4.7a	5.7ab	7.3a	6.7ab	5.3b-d	7.3ab	5.7ab	6.1bc	5.3a	5.3b-d
Penneagle-Seaside	5.7a	5.7ab	6.7a	5.7bc	5.3b-d	7.0a-c	5.7ab	6.0b-d	5.0a	5.3bd
Penncross	5.3a	6.0ab	6.3a	5.3c	5.7a-c	7.0a-c	5.3a-c	5.8b-e	5.7a	6.3a
Penncross-Emerald	4.7a	5.7ab	6.0a	5.0c	5.3b-d	7.0a-c	5.0a-d	5.7b-e	6.3a	5.7a-c
Penncross-Seaside	5.7a	5.3bc	6.3a	5.0c	5.0cd	6.3b-d	4.7b-e	5.5c-e	5.3a	5.3b-d
Emerald	5.3a	4.7cd	6.7a	6.0bc	5.0cd	6.0cd	4.0de	5.4de	6.0a	5.0cd
Seaside-Emerald	5.3a	4.3d	6.3a	5.0c	5.0cd	6.3b-d	4.3c-e	5.2e	6.0a	4.7d
Seaside	5.7a	4.3d	6.7a	5.7bc	4.7d	5.7d	3.7e	5.2e	6.0a	4.7d

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 0.05 level as determined by Duncan's Multiple Range test.

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

[3]Values represent the mean of 21 scores obtained from 3 replications and 7 evaluation dates.

[4]Disease evaluations are made on a 1-9 scale, where 9 = no disease visible and 1 = complete necrosis.

THE EFFECTS OF SAND TOPDRESSING ON A CREEPING BENTGRASS PUTTING GREEN

T. W. Fermanian and J. E. Haley

It is generally agreed that topdressing bentgrass greens is a valuable practice. However, opinions often vary as to what constitutes a good topdressing program. In recent years, interest has increased in a pure sand topdressing program develped by Dr. John Madison and his associates at the University of California. This involves the application of 100% sand to the surface of the turfgrass stand on a routine basis throughout the year.

The purpose of this study is to examine the effects of pure sand and modified high sand mixes as topdressing materials on the degradation of thatch, its influence on other soil properties and its influence on turfgrass quality.

The study uses as split plot design with three replications per treatment. The main treatments consist of three replication intervals and a check. They include:

1) biweekly applications, no cultivation
   2 cu ft material/1000 sq ft
2) monthly applications
   vertical mowing in April, May, Sept., Oct.
   4 cu ft material/1000 sq ft
3) bimonthly applications
   vertical mowing in April, Oct.
   4 cu ft/1000 sq ft

The subplots consist of 6 materials. They are a fine sand, a medium sand, a 9:1 sand-soil mix, an 8:1:1 sand-soil-peat mix, milorganite and a 9:1 sand-soil mix with a wetting agent.

The fine sand is a washed blend sand with the following particle size analysis:

Very coarse	0.7%
Coarse	1.3%
Medium	59.8%
Fine	34.3%
Very fine	3.4%
Silt and clay	0.5%

The medium sand is a washed mason sand with the following particle size analysis:

Very coarse	3.9%
Coarse	14.3%
Medium	75.3%
Fine	6.5%
Very fine	0.0%
Silt and clay	0.0%

Both these sands have the minimum analysis of 75% of the particles in two adjacent size ranges. This is in accordance with Madison's recommendations for sands for topdressing and greens construction.

The first treatments were applied July 13, 1981 to a Washington creeping bentgrass turf mowed at 1/4 inch. Plot size is 6' x 10'. All of the mixes were blended with the medium sand. The milorganite plots receive a total of 6 lbs N/1000 sq ft/year corresponding to the application intervals. The remaining plots receive a total of 6 lbs N/1000 sq ft/year from another source. The wetting agent, Aquagro, is applied at a rate equal to 32 oz/1000 sq ft/year.

Treatments for 1982 began April 26. Plot maintenance and treatment application followed the 1981 schedule. Turfgrass evaluations made during the 1982 growing season included quality and annual bluegrass infestation (Table 10). In general, there was little difference among the sand topdressing programs. Any quality differences that were seen reflected the timing of the application. In all sand topdressing programs medium sand and milorganite provided the lowest turfgrass quality. Annual bluegrass infestation was greatest in the programs that included vertical mowing and in plots where milorganite is used.

Table 10. Evaluation of sand topdressing materials.[1]

Material	Quality[2] 5/18	8/17	9/28	All Dates[3] 1982	Annual Bluegrass[4] 5/18
1 application/2 weeks; 2 cu ft material/1000 sq ft					
fine sand	6.3a	7.0a	6.7a	6.6a	13.3b
medium sand	6.3a	4.3b	3.3b	5.0c	13.3b
sand:soil, 9:1	6.7a	6.3a	6.7a	6.6a	13.3b
sand:soil:peat, 8:1:1	6.7a	6.3a	6.0a	6.3ab	13.3b
milorganite	6.3a	5.0b	6.0a	5.9b	26.7a
sand:soil, 9:1 + wetting agent	6.5a	7.0a	7.0a	6.8a	8.3b
1 application/month; vertical mowing in April, May, Sept. Oct.; 4 cu ft material/1000 sq ft					
fine sand	6.7a	8.7a	5.7a	7.0a	28.3ab
medium sand	6.7a	5.7b	3.7b	5.7b	15.0c
sand:soil, 9:1	6.7a	8.0a	6.0a	6.9a	25.0a-c
sand:soil:peat, 8:1:1	7.2a	8.7a	5.7a	7.2a	21.7b-c
milorganite	4.2b	5.7b	5.0ab	5.1b	33.3a
sand:soil, 9:1 + wetting agent	7.0a	8.3b	6.0a	7.0a	20.0b-c
1 application/2 months; vertical mowing in April, Oct; 4 cu ft material/1000 sq ft					
fine sand	5.0a	7.3ab	7.7a	6.6ab	35.0a
medium sand	5.0a	6.0c	6.0c	5.8bc	33.3a
sand:soil, 9:1	5.3a	7.7a	7.3ab	6.8a	25.0a
sand:soil:peat, 8:1:1	4.8a	7.0a-c	7.7a	6.4a-c	33.3a
milorganite	3.8b	6.3bc	6.3bc	5.5c	40.0a
sand:soil, 9:1 + wetting agent	5.2a	7.7a	6.7a-c	6.5ab	33.3a

[1]All values represent the mean of 3 replications. Means withthe same letter (within a topdressing program) are not signficantly different at the 0.05 level as determined by Fishers Least Significant Difference test.

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

[3]Values represent the mean of 9 scores from 3 replications and 3 evaluation dates.

[4]% Annual bluegrass evaluations are made on a 0-100 scale, where 100 = turfgrass quality and 1 = very poor turfgrass quality.

FAIRWAY BENTGRASS MANAGEMENT STUDY

D. J. Wehner and J. E. Haley

Creeping bentgrass has not been widely utilized for golf course fairways because of its aggressive nature and requirement for high levels of maintenance. However, annual bluegrass, which is a predominant component of many golf course fairways and is susceptible to heat and drought injury, can also require high levels of maintenance to produce quality turf. The purpose of this research is to evaluate the creeping bentgrass cultivars Prominent, Penncross, Penneagle, Seaside, Emerald, and Highland colonial bentgrass under varying levels of fairway management.

The large blocks of each cultivar have been split so that half the area is receiving a preventative fungicide program while the other half receives no fungicide. Perpendicular to the fungicide strips are cultivation treatments consisting of vertical mowing, core aerification, or no cultivation. The plots are monitored for turfgrass quality, thatch buildup, and disease severity. Plots are mowed at 5/8" and given 3 lbs nitrogen/1000 sq ft/yr as 18-5-9.

During 1982, the first year of the study, the fungicide treated plots received sprays of Daconil 2787, Fungo, Chipco 26019, and Tersan 1991. Major quality differences started to appear in June with the incidence of dollarspot (Table 11). Fungicide treated plots had higher quality ratings than the non-sprayed plots until October when dollarspot activity subsided. The lower overall quality ratings for Penncross and Penneagle resulted from their poorer mowing quality during very warm weather. Emerald lacked the vigor to prevent crabgrass from becoming a problem and thus, received lower quality ratings. We expect to see differences due to cultivation treatment as this study matures.

Table 11. Quality evaluation for creeping bentgrass maintained as a fairway turf.[1]

Treatment		Quality[2] 8/6	Quality[2] 9/28
Fungicide[3]		6.0a[3]	6.6a
No Fungicide		4.0b	3.2b
Prominent[3]		5.2a	5.1ab
Seaside		5.5a	5.3ab
Penncross		5.1a	4.6bc
Penneagle		4.9ab	4.5bc
Highland		5.2a	5.5a
Emerald		4.3b	4.2c
Core cultivation[3]		5.2a	5.0a
Vertical mowing		5.0a	4.8a
No cultivation		5.0a	4.8a
Prominent	fungicide		6.7a
Prominent	no fungicide		3.6cd
Seaside	fungicide		7.6a
Seaside	no fungicide		3.0de
Penncross	fungicide		6.8a
Penncross	no fungicide		2.4e
Penneagle	fungicide		6.7a
Penneagle	no fungicide		2.4e
Highland	fungicide		6.8a
Highland	no fungicide		4.2bc
Emerald	fungicide		5.1b
Emerald	no fungicide		3.4c-e

[1]All values represent the mean of 4 replications per treatment. Means with the same letter are not significantly different at the 0.05 level as determined by Fishers's Least Significant Difference test.

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

[3]Quality ratings for fungicide, cultivar, and cultivation are averaged over all other treatments.

LIQUID NITROGEN FERTILIZERS FOR HOME LAWNS

B. G. Spangenberg and T. W. Fermanian

Rapid growth of the home lawn care industry in recent years has brought an increased demand for liquid applied nitrogen fertilizers. Liquid application can offer advantages such as reduced labor, easier handling of materials, and simpler mixing and calibration for a home lawn care company. Much of the research conducted on some of the newer materials is done by private industry, so results are not available to others. The objective of this study was to evaluate various liquid and granular nitrogen fertilizers in a home lawn use situation.

This study began on 1 May, 1981 and carried through the 1982 season. Each treatment was replicated 3 times in 3 by 10 foot plots on an established stand of 'Columbia-Touchdown' Kentucky bluegrass (Poa pratensis, L.). Liquid materials were applied using a CO_2 backpack sprayer with an 8015E nozzle, 25 psi, giving a final spray volume of 4 gallons per 1000 sq ft. Granular materials were applied by hand. Application dates in 1982 were 21 April, 18 June, 19 August, and 15 October.

Fertilizers in this study applied as liquids include Folian (12-4-4 and 12-4-6), Formolene, FLUF, Nitroform, UAN, and urea. A treatment of Formolene is also acidified to add more water-insoluble nitrogen (WIN) for a longer residual response. Granular materials include ammonium nitrate, ammonium sulfate, ammonium sulfate with a bacterial inhibitor, sulfur-coated urea (LESCO), urea, and urea with a bacterial inhibitor. Furthermore, urea was added to some of the controlled-release sources (FLUF, Formolene, and Nitroform) for faster turf response. Chelated iron was also added to all of the liquid nitrogen sources (except Nitroform and UAN) for quick green-up of the turf, cutting down the amount of nitrogen applied. Nitrogen rates are generally 1 pound of actual nitrogen per 1000 sq ft. per application, which were cut to 0.50 pounds of nitrogen per 1000 sq ft. when iron was used. Sulfur-coated urea is applied only twice (April and Aug.) with 2 pounds of nitrogen per 1000 sq ft. applied. On a yearly basis, all plots received 4 pounds of nitrogen per 1000 sq ft. except the iron mixture treatments, which received 3 pounds of nitrogen per 1000 sq ft. per year.

Color, growth rate, fertilizer efficiency, thatch development, phytotoxicity of fertilizer materials, and turf density were the parameters monitored in 1982. Color ratings were made daily for a 2-week period following application, and then on a weekly basis. Color was a visual rating using a scale of 1 to 9, with 9 representing ideal turf color. Growth rate was determined by the fresh clipping weights taken every 2 weeks. Fertilizer efficiency is reflected in the percent total nitrogen found in oven-dried clippings using the Kjeldahl method. Thatch development was measured as the thickness of compressed thatch on 2" square plugs removed from each plot. Any phytotoxicity (burn) following application was recorded as a visual rating of the percentage of turf burned. Density was determined using shoot counts as well as visual ratings. There were no major disease occurences in 1982.

In looking at the color response curves of 1982, the differences between totally soluble materials and those with slow-release characteristics were quite clear. Totally soluble sources, such as urea and Folian, show a curve with a sharp peak after application, followed by a valley until the next application. This cycle continued over the entire season but as the season progressed the peaks did not rise as high as the time before. In contrast, the curve of a slow release material, such as Nitroform, showed a rather straight line which steadily rose as the season progressed. This was probably due to the gradual release of nitrogen, as well as the improved turf condition (as compared to totally soluble plots) as warmer weather occured.

Instead of presenting the responses of each material over the season, the color data for each treatment was compared to the response of liquid urea. Liquid urea was chosen since it was considered the early standard of the industry and is still a widely used standard. The results of the comparison are found in Table 12. The table consists of 3 sets of 3 columns. The first set is the number of days following application until the color response was equal to or better than that of liquid urea. The second set of columns contains the percentage of each round where the material had a color response which was equal to or better than that of the liquid urea. The third set of columns contains the percentage of observation dates where the response was significantly greater than liquid urea at the 5 percent level. The symbols R1, R2, and R3 represent each round; a round being the period of time following an application up until the next application. There were no figures from round 4 because it begins in mid-October and was not long enough to generate sufficient data before the turf went dormant.

Most of the granular materials showed equal or better response than liquid urea throughout the season. Granular urea seemed to show a higher "peak" than liquid applied urea, as reflected in the third set of columns. Iron treatments showed a short period of favorable response after application, as they did in 1981. The exceptions are the relatively long periods of response of the FLUF and urea combinations with iron in round 3, which didn't occur in 1981. It is also important to note the optimum response of the slow release materials in the third round, most notably Nitroform with 75 percent of the observation dates in round 3 showing significantly higher values than liquid urea. All of the periods of favorable response increase with ureaformaldehyde compounds such as FLUF and Nitroform as the season progresses. Finally, the highly favorable response of sulfur-coated urea in round 3 is somewhat misleading since 2 pounds of actual nitrogen were put on at that time. However, sulfur-coated urea has shown the most consistently favorable color response of all treatments over the 2 seasons of this study.

Growth rate in 1982 and thatch accumulation after 2 seasons of this study are shown in Table 13. Ammonium sulfate and ammonium sulfate with an inhibitor both showed the highest compressed thatch readings. These plots also showed the significantly lowest soil pH values of all treatments. Nitroform and Formolene both showed low thatch accumulation. The slight thatching tendency of FLUF is somewhat surprising, though it still is not at a problem level. Generally, differences in growth rate between treatments was rather small. As expected, the addition of iron and reduction of nitrogen gave a lower growth rate than the same nitrogen soure at a higher rate without iron.

Data from Folian is not included in the results because the responses from the Folian plots in 1982 were actually first-year responses, due to an error in calibration in 1981. All other data in 1982 was second-year responses. However, responses of Folian in 1982 were very similar to those of liquid urea.

Table 12. 1982 Color response of Kentucky bluegrass turf to various nitrogen fertilizers compared to liquid urea.[1]

Treatment[2]	Days until ≥ liq. urea[3]			Percentage of days ≥ liq. urea[3]			Percentage of observation dates significantly[11] > liq. urea[3]		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
Granular-applied									
urea	1	1	1	84	100	100	10	200	25
urea w/inhibitor	1	1	1	100	100	100	43	40	25
ammonium sulfate	3	1	2	73	93	57	5	27	0
Amm. sulf. w/inhibitor	28	1	12	29	72	46	0	27	0
ammonium nitrate	1	1	1	100	100	100	5	20	31
sulfur-coated urea+[4]	13	1	1	71	47	100	19	7	88
Liquid-applied									
Formolene	1	1	1	45	85	64	5	0	0
Formolene/urea[5]	1	3	1	46	53	80	0	0	0
Formolene/iron[7]	1	1	2	25	8	52	10	0	0
Formolene/WIN	14	1	1	75	65	100	10	0	0
FLUF	3	1	1	34	38	100	5	0	13
FLUF/urea 2:2[5]	1	3	1	20	60	46	0	0	0
FLUF/urea 3:1[6]	4	1	3	16	23	88	0	0	6
FLUF/iron 1&2[7]	2	1	2	11	5	50	0	0	0
FLUF/iron 2&3[8]	0	1	1	0	12	91	0	0	50
Nitroform	3	1	1	7	52	100	5	7	75
Nitroform/urea 1[9]	1	1	1	34	100	38	10	53	19
Nitroform/urea 2	1	3	1	21	55	86	5	0	13
urea/iron 1 & 2[7]	1	1	2	48	23	46	10	0	0
urea/iron 2 & 3[8]	1	1	1	45	17	64	0	0	31
UAN	1	6	14	57	37	27	0	0	0

[1]All values represent the mean of 3 replications.
[2]All treatments 1 pound of nitrogen/1000 sq. ft./application except as noted.
[3]R1 = April 21 (application date) through June 17. 56 days.
R2 = June 18 (application date) through August 18. 60 days.
R3 = August 19 (application date) through October 14. 56 days.
[4]2.0 lb. N/1000 sq. ft. - R1, R3
[5]0.5 lb. N/1000 sq. ft. from each source on all rounds
[6]0.75 lb. N/1000 sq. ft. FLUF, 0.25 lb. N/1000 sq. ft. urea all rounds
[7]0.5 lb. N/1000 sq. ft., 0.75 oz. iron/1000 sq. ft. - R1, R2; 1.0 lb. N/1000 sq. ft. R3, R4
[8]0.5 lb. N/1000 sq. ft., 0.75 oz. iron/1000 sq. ft. - R2, R3; 1.0 lb. N/1000 sq. ft. R1, R4
[9]0.5 lb. N/1000 sq. ft. urea, R1; 1.5 lb. N/1000 sq. ft. Nitroform, 0.25 lb. N/1000 sq. ft. urea, R2; and 1.25 lb. N/1000 sq. ft. Nitroform, 0.5 lb. N/1000 sq. ft. urea, R4
[10]0.5 lb. N/1000 sq. ft. urea, R1: 0.5 lb. N/1000 sq. ft. from each, R2, R3; and 1.0 lb. N/1000 sq. ft. Nitroform 0.5 lb. N/1000 sq. ft. urea, R4
[11]Significance at 5% level.

Table 13. 1982 Growth rate and thatch accumulation of Kentucky bluegrass turf treated with various nitrogen fertilizers.[1]

Treatment[10]	Compressed thatch millimeters	Fresh clipping weight[2] grams				
	6 Oct.	18 May	17 June	15 July	26 Aug.	16 Sept.
granular-applied						
urea	11.2b-f	162.6ab	115.8b-d	87.8ab	100.0ab	81.0a
urea w/inhibitor	12.7b-e	163.6ab	82.5g-i	81.7a-c	101.0ab	69.8a-c
ammonium sulfate	19.3a	148.6a-d	102.0c-g	77.4a-d	81.9a-d	79.9a
amm. sulf. w/inhibitor	19.2a	77.0f-h	115.1b-d	58.3d-f	63.6cd	61.7a-c
ammonium nitrate	15.9ab	163.5ab	103.1c-g	77.4a-d	97.2a-c	73.9ab
sulfur-coated urea[3]	14.0a-d	133.0a-e	141.0a	62.1c-f	100.7ab	79.5a
liquid-applied						
Formolene	7.9c-f	127.9b-e	109.5c-f	70.8b-e	113.5a	68.9a-c
Formolene/urea[4]	7.7d-f	138.0a-e	114.4b-d	70.9b-e	102.5ab	81.1a
Formolene/iron[6]	4.8f	119.3b-e	94.2d-h	55.0d-g	107.7a	82.1a
Formolene/WIN	8.7c-f	174.6a	135.5ab	82.0a-c	112.5a	79.0a
FLUF	12.6b-e	117.9c-e	97.4c-g	66.6b-e	89.8a-c	69.9a-c
FLUF/urea 2:2[4]	9.9b-f	136.9a-e	105.1c-g	71.6b-e	93.4a-c	70.9a-c
FLUF/urea 3:1[5]	9.1c-f	149.5a-d	111.8c-f	68.1b-e	99.9ab	84.1a
FLUF/iron 1&2[6]	6.4ef	99.9e-g	90.7e-h	41.1f-h	68.4bc	68.6a-c
FLUF/iron 2&3[7]	6.3ef	116.5c-f	105.4c-g	57.5d-f	92.6a-c	76.2ab
Nitroform	7.0ef	134.9a-e	113.0c-e	75.1a-e	92.4a-c	82.2a
Nitroform/urea[8]	14.2a-c	129.1b-e	118.4bc	94.9a	107.1a	72.3ab
Nitroform/urea[9]	6.3ef	138.1a-e	114.0b-d	74.6a-e	103.3a	66.9a-c
urea	9.6c-f	145.6a-d	100.3c-g	64.5c-e	95.4a-c	66.3a-c
urea/iron 1&2[6]	5.9f	123.3b-e	102.6c-g	54.4e-g	94.1a-c	69.8a-c
urea/iron 2&3[7]	8.4c-f	151.0a-c	89.3f-h	54.8d-g	81.1a-d	62.5a-c
UAN	8.8c-f	156.5ab	104.5c-g	63.0c-f	101.4ab	80.1a
check	7.9c-f	47.6h	66.9i	28.9h	64.2cd	52.5b-c

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 0.05% level as determined by Duncan's Multiple Range Test.
[2]Application Dates--21 April, 18 June, 19 August, and 15 October.
[3]2.0 lb. N/1000 sq. ft., April and August.
[4]0.5 lb. N/1000 sq. ft. from each source all applications.
[5]0.75 lb. N/1000 sq. ft. FLUF, 0.25 lb. N/1000 sq. ft. urea all applications.
[6]0.5 lb. N/1000 sq. ft., 0.75 oz. Iron/1000 sq. ft. April, June; 1.0 lb. N/1000 sq. ft. August and October
[7]0.5 lb. N/1000 sq. ft., 0.75 oz. Iron/1000 sq. ft., June, Aug.; 1.0 lb. N/1000 sq. ft. April and October.
[8]0.5 lb. N/1000 sq. ft. urea, April; 1.5 lb. N/1000 sq. ft., Nitroform, 0.25 lb. N/1000 sq. ft. urea, June; and 1.25 lb. N/1000 sq. ft. Nitroform, 0.5 lb. N/1000 sq. ft. urea, October
[9]0.5 lb. N/1000 sq. ft. urea, April; 0.5 lb. N/1000 sq. ft. from each, June and August; and 1.0 lb. N/1000 sq. ft. Nitroform, 0.5 lb. N/1000 sq. ft. urea, October
[10]All treatments 1 pound of nitrogen/1000 sq. ft./application except as noted.

NITROGEN CARRIER RATES STUDY

B. G. Spangenberg and T. W. Fermanian

When applying fertilizers in liquid form to turf, a spray volume of 4 gallons or more is generally used. If a fertilizer could be safely applied with reduced amounts of water, it would be possible to spray more lawns with one tankful of material, or to spray the same number of lawns with a smaller tank. The purpose of this study was to evaluate the effects of a one pound nitrogen/1000 sq ft application at various carrier rates and to evaluate the phytotoxic effects of the nitrogen-carrier rate on a Kentucky bluegrass turf.

Five liquid-applied nitrogen fertilizers are used in this trial: FLUF, Folian, Formolene, urea, and UAN. These are also found in the "Liquid Nitrogen Fertilizers for Home Lawns" study, using a spray volume of 4 gallons per 1000 sq. ft. FLUF and Formolene, which are not totally soluble nitrogen sources, were applied at rates of 3, 2, 1 and 0.50 (Formolene) and 3, 2, 1 and 0.59 (FLUF) gallons per 1000 sq. ft. All carrier rates apply 1 pound of nitrogen per 1000 sq. ft. Application dates in 1982 were 8 May, 23 June, 26 July, and 12 October. Materials were applied using a CO_2 backpack sprayer. Plot size was 3 x 5 ft.

Following application the plots were monitored for phytoxicity or burn to the turfgrass. This is a visual rating describing the total shoot burn appearing on the plots after fertilizer application. A rating of 0 to 5 percent is considered within the acceptable injury range.

The results from 1982 (Table 14) show a clear separation between totally soluble materials and those with some slow-release characteristics. FLUF and Formolene showed small amounts of burn, even at the lowest carrier rate, in all applications. Folian, urea and UAN showed significantly higher percentages of burn. However, in 1982 heat or drought stress was not a factor around the application dates. Burn percentages could possibly be higher for all materials in a hotter and drier year.

Table 14. 1982 Mean leaf area injury from liquid nitrogen fertilization.[1]

Treatment	Carrier rate (gal./1000 sq. ft.)	Percent Tip-burn[2,3]
UAN (28-0-0)	2.0	9.2a
UAN (28-0-0)	1.0	8.7a
Folian (12-4-6)	2.0	7.9a
Folian (12-4-6)	1.0	6.4b
Folian (12-4-6)	3.0	5.9bc
UAN (28-0-0)	3.0	5.7bc
urea (46-0-0)	1.0	5.5bc
urea (46-0-0)	2.0	5.4bc
UAN (28-0-0)	5.0	5.2bc
urea (46-0-0)	3.0	5.0bc
Folian (12-4-6)	5.0	4.7c
urea (46-0-0)	5.0	3.4d
Formolene (30-0-2)	0.50	1.0e
Formolene (30-0-2)	1.0	0.9e
FLUF (18-0-0)	0.59	0.4e
Formolene (30-0-2)	2.0	0.3e
Formolene (30-0-2)	3.0	0.2e
FLUF (18-0-0)	1.0	0.1e
FLUF (18-0-0)	2.0	0.0e
FLUF (18-0-0)	3.0	0.0e

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 5% level as determined by Duncan's Multiple Range Test.

[2]Percent tip burn evaluations are visual ratings made on a 0 to 100 scale where 0 = no burn and 100 = 100% of the turf is burned.

[3]Data is combined totals of applications 2, 3 and 4. Application dates are 8 May, 23 June, 26 July and 12 October.

NITROGEN FERTILIZER MATERIALS AND PROGRAM EVALUATION

J. E. Haley and T. W. Fermanian

Good turfgrass growth depends on an adequate supply of all the essential elements as well as proper environmental and cultural conditions. Nitrogen is an essential element which receives the most attention in turfgrass fertilization programs. The turf manager can regulate the plant's growth by adding or withholding nitrogen while maintaining adequate supplies of other elements.

A number of nitrogen containing fertilizers, both water soluble and slow release, are available for turfgrass fertilization. These materials vary considerably in their chemical and physical properties. Slow-release products such as ureaformaldehyde (UF) and milorganite (natural organic) have been available for years. Others, such as isobuylidene diurea (IBDU) and methylene ureas, are newer while sulfur-coated ureas are just now becoming important in the industry. Since slow-release nitrogen sources are important components of commercial turf fertilizers, it is important to monitor the performance of existing products versus new products. Safety, efficiency, initial plant response, residual response and cost are all consideration in the development and utilization of fertilizers and fertilization programs.

The primary objective of this trial is to evaluate over a period of several years the effect of several slow release nitrogen fertilizers on an improved Kentucky bluegrass turf (Table 15).

The study was initiated on a one year old stand of 'Baron' Kentucky bluegrass. Treatments consist of 14 nitrogen carriers or combinations of carriers applied at 1 lb N/1000 sq ft in May, June, September and October (Program I); 2 lb N/1000 sq ft applied in May and September (Program II); and 4 lb N/1000 sq ft applied in May (Program III). A control plot, receiving no nitrogen, is included in each program. Each treatment is replicated three times with plots 5 x 6 feet in a split plot design. Mowing is performed 2 or 3 times weekly at 1.5 inches. Clippings are returned intact to the plots. Irrigation is performed as needed to prevent wilt. Fertilizer materials and programs are evaluated on a basis of general turfgrass quality with periodic ratings of turf color and visual density.

Throughout the 1982 growing season, all fertilizer materials and fertilization programs provided good to excellent turfgrass quality with few exceptions (Tables 16, 17, 18). In general the best turf quality was seen with IBDU, the sulfur-coated ureas and mixes of these materials with urea. The turfgrass quality in plots fertilized with milorganite or Hercules UF was generally lower than the turfgrass quality in plots testing other materials. However turf quality with Hercules UF and milorganite increased steadily throughout the season. Turf density was good to excellent with all the materials tested.

There was little difference in turf quality between the fertilization Programs I and III. In general, both of these programs provided better turf quality than Program III. No fertilizer burn was apparant with program III when the materials were applied to a dry turf and watered in immediately following application.

Table 15. Nitrogen sources, rates, and application frequencies.

Fertilizer	Analysis	Program Application Dates I (1 lb N/M)	II (2 lb N/M)	III (4 lb N/M)
1. Scotts 1.9/1 Methylene Urea	39-0-0	April, May, Aug., Sept.	April, Aug.	April
2. Hercules UF	38-0-0	" " "	" "	"
3. Milorganite	6-2-0	" " "	" "	"
4. Swifts IBDU Coarse	31-0-0	" " "	" "	"
5. Canadian Industries Limited - SCU	32-0-0	" " "	" "	"
6. Lakeshore SCU	36-0-0	" " "	" "	"
7. Lakeshore Fairway	28-3-9	" " "	" "	"
8. Scotts - SCU	38-0-0	" " "	" "	"
9. Urea	45-0-0	" " "	" "	"
10. Tennessee Valley Authority - SCU	36-0-0	" " "	" "	"
11. IBDU, TVA-SCU, Urea 24%, 57%, 19%	———	" " "	" "	"
12. IBDU, CIL-SCU, Urea 37%, 43%, 20%	———	" " "	" "	"
13. IBDU, CIL-SCU, Urea 39%, 40%, 21%	———	" " "	" "	"
14. IBDU, CIL SCU, Urea 22%, 60%, 18%	———	" " "	" "	"

Table 16. Evaluation of nitrogen sources, rates and application frequencies.[1] Program I (1 lb N/1000 sq ft in May, June, Sept. Oct.).

Fertilizer	Quality[2] 4/20	5/12	6/22	8/18	10/14	11/18	All Dates 1982[3]
Scotts 1.9/1 Methylene Urea	7.0ab	7.3a-c	7.7ab	8.0ab	8.7a	8.0a	7.8a-c
Hercules UF	5.7d	6.3c	7.0b	8.0ab	8.0a	8.0a	7.2d
Milorganite	6.0cd	7.3a-c	7.7ab	8.0ab	8.0a	7.3a	7.4cd
Swifts IBDU	7.7a	8.3a	8.0a	8.0ab	8.3a	7.7a	8.0ab
CIL-SCU	6.7bc	6.7bc	8.0a	8.3a	8.7a	8.3a	7.8a-c
Lakeshore SCU	7.3ab	8.0ab	8.0a	8.7a	8.3a	8.3a	8.1ab
Lakeshore Fairway	7.0ab	8.3a	8.3a	8.7a	9.0a	8.0a	8.2a
Scott's SCU	7.3ab	6.7bc	8.0a	8.0ab	8.3a	8.3a	7.8a-c
Urea	7.0ab	7.0a-c	7.7ab	8.3a	8.7a	8.7a	7.9a-c
TVA-SCU	7.3ab	7.7a-c	8.3a	7.7ab	8.0a	7.3a	7.7a-d
IBDU 24%, TVA-SCU 57%, Urea 19%	7.3ab	7.3a-c	8.0	8.0ab	8.7a	7.7a	7.8a-c
IBDU 37%, CIL-SCU 43%, Urea 20%	6.7bc	6.7bc	7.7ab	8.0ab	8.3a	8.3a	7.6b-d
IBDU 39%, CIL-SCU 40%, Urea 21%	7.7a	7.7a-c	7.7ab	7.7ab	8.0a	7.7a	7.7a-d
IBDU 22%, CIL-SCU 60%, Urea 18%	7.3ab	7.0a-c	7.7ab	7.0b	8.7a	7.7a	7.6b-d
Control	2.0e	3.0d	4.0c	4.3c	3.7b	3.3b	3.4e

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 0.05 level as determined by Fishers Least Significant Difference Test.

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

[3]Values represent the mean of 18 scores from 3 replications and 6 evaluation dates.

Table 17. Evaluation of nitrogen sources, rates and application frequencies.[1] Program II (2 lb N/1000 sq ft in May and September).

	Quality[2]						All Dates[3]
Fertilizer	4/20	5/12	6/22	8/18	10/14	11/18	1982
Scotts 1.9/1 Methylene Urea	6.3a-c	7.7ab	8.7ab	7.7a-c	9.0a	8.0a-c	7.9a-c
Hercules UF	6.0bc	6.3c	7.3d	7.7a-c	8.3ab	7.7a-c	7.2d
Milorganite	5.7c	7.3a-c	7.7cd	7.3bc	8.3ab	7.3bc	7.3cd
Swifts IBDU	7.3a	7.7ab	8.7ab	8.0a-c	9.0a	8.0a-c	8.1ab
CIL-SCU	6.3a-c	6.3c	8.0b-d	8.0a-c	9.0a	7.3bc	7.5b-d
Lakeshore SCU	6.7a-c	7.7ab	9.0a	8.7a	8.7ab	8.7a	8.2a
Lakeshore Fairway	6.7a-c	8.3a	9.0a	8.3ab	8.7ab	8.0a-c	8.2a
Scott's SCU	6.7a-c	6.3c	9.0a	8.0a-c	8.3ab	8.3ab	7.8a-d
Urea	6.7a-c	6.7bc	8.3a-c	7.7a-c	8.7ab	8.3ab	7.7a-d
TVA-SCU	7.3a	7.0bc	8.7ab	7.0c	8.0b	7.7a-c	7.6a-d
IBDU 24%, TVA-SCU 57%, Urea 19%	7.3a	7.3a-c	8.7ab	7.3bc	8.7ab	8.3ab	7.9ab
IBDU 37%, CIL-SCU 43%, Urea 20%	7.0ab	7.0bc	8.7ab	7.3bc	8.3ab	7.3bc	7.6a-d
IBDU 39%, CIL-SCU 40%, Urea 21%	7.3a	7.7ab	8.7ab	7.3bc	8.3ab	7.7a-c	7.8a-d
IBDU 22%, CIL-SCU 60%, Urea 18%	7.0ab	6.7bc	8.0b-d	7.0c	8.0b	7.0c	7.3cd
Control	2.0d	3.3d	4.0e	3.7d	3.7d	3.3d	3.3e

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 0.05 level as determined by Fishers Least Significant Difference Test.

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

[3]Values represent the mean of 18 scores from 3 replications and 6 evaluation dates.

Table 18. Evaluation of nitrogen sources, rates and application frequencies.[1] Program III (4 lb N/1000 sq ft in May).

Fertilizer	Quality[2]						All Dates[3]
	4/20	5/12	6/22	8/18	10/14	11/18	1982
Scotts 1.9/1 Methylene Urea	5.0a-c	5.3ab	8.7ab	8.0ab	8.7ab	6.0cd	6.9a
Hercules UF	5.0a-c	6.0ab	8.0b	8.0ab	8.7ab	7.3ab	7.2a
Milorganite	4.7bc	6.0ab	8.0b	8.0ab	9.0a	6.3b-d	7.0a
Swifts IBDU	6.0a	6.7a	8.7ab	7.7ab	8.3a-c	7.0a-c	7.4a
CIL-SCU	4.3c	5.0b	8.7ab	8.0ab	8.7ab	5.7d	6.7a
Lakeshore SCU	5.3a-c	6.0ab	9.0a	9.0a	9.0a	7.7a	7.7a
Lakeshore Fairway	5.0a-c	5.3ab	8.7ab	8.0ab	8.7ab	6.7a-d	7.1a
Scott's SCU	5.7ab	5.3ab	9.0a	8.0ab	8.3a-c	6.7a-d	7.2a
Urea	5.0a-c	5.0b	8.7ab	7.7ab	7.7c	6.3b-d	6.7a
TVA-SCU	6.0a	6.3ab	8.3ab	7.7ab	8.3a-c	7.3ab	7.3a
IBDU 24%, TVA-SCU 57%, Urea 19%	5.7ab	6.3ab	9.0a	7.7ab	8.3a-c	6.3b-d	7.2a
IBDU 37%, CIL-SCU 43%, Urea 20%	5.3a-c	6.0ab	8.7ab	7.7ab	8.0bc	6.0cd	6.9a
IBDU 39%, CIL-SCU 40%, Urea 21%	5.3a-c	5.7ab	8.3ab	7.3b	8.0bc	6.3b-d	6.8a
IBDU 22%, CIL-SCU 60%, Urea 18%	5.3a-c	5.3ab	8.7ab	7.0b	8.3ac	6.3b-d	6.8a
Control	2.0d	3.3c	4.0c	3.7c	4.0d	3.3e	3.4b

[1]All values represent the mean of 3 replications. Means with the same letter are not significantly different at the 0.05 level as determined by Fishers Least Significant Difference Test.

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

[3]Values represent the mean of 18 scores from 3 replications and 6 evaluation dates.

THE EVALUATION OF LATE FALL FERTILIZATION

J. E. Haley and D. J. Wehner

Early spring greenup and turfgrass growth depends on adequate nitrogen supplies early in the season. However, early fertilization is not always possible for a home lawn care company if weather does not permit early field work or if customers are obtained later in the season. The purpose of this trial was to evaluate the spring response of the slow release materials IBDU and sulfur coated urea (SCU) and the quick release material urea applied in late fall versus the response of urea applied in early spring.

The trial was established September 7, 1982 on a 3 month old stand of Baron Kentucky bluegrass and on an adjacent 3 month old stand of Kenblue Kentucky bluegrass. The materials being evaluated are urea, 45-0-0; IBDU, 31-0-0 and CIL-SCU, 32-0-0. Materials will be applied as lbs nitrogen/1000 sq ft as follows:

Trt.	Following First Mowing	June 1	July 15	Sept. 1	Nov. 1
1	1.25 urea	1.0 urea	0.75 urea	1.0 urea	0
2	0	1.0 urea	0.75 urea	1.0 urea	1.25 urea
3	0	1.0 urea	0.75 urea	1.0 urea	1.25 SCU
4	0.5 urea	1.0 urea	0.75 urea	1.25 urea	0
5	0	2.0 IBDU	0	2.0 IBDU	0
6	0	2.0 SCU	0	2.0 SCU	0
7	0	2.0 IBDU	0	0	2.0 IBDU
8	0	2.0 SCU	0	0	2.0 SCU
9	0	1.0 IBDU	0	1.0 IBDU	1.5 IBDU
10	0	1.0 SCU	0	1.0 SCU	1.5 SCU
11	check	check	check	check	check

Plots size is 3 x 12 feet and materials are applied by hand. Over the years treatments will be evaluated for turfgrass response to quality, density, resistance to disease, and environmental stress.

ETIOLOGY OF SEVERAL ILLINOIS TURFGRASS DISEASES

H. T. Wilkinson

As part of the new research program in the Department of Plant Pathology, the occurrence and causal agents of new or poorly researched turfgrass disease will be investigated. One such disease is yellow patch or cool weather brown patch. Fortunately, the causal of this disease agent is known and identified as Rhizoctonia cerealis. While the causal agent is known, the parameters of environmental conditions necessary for infection and disease development as well as the control of this disease are not understood. I have undertaken to study this disease with the objectives of: i) to determine the edaphic conditions that lead to the development and, ii) to determine if available fungicides or selected microorganisms could be used to control this pathogen.

I have also undertaken research to determine the etiology and biology of an unknown basidiomycete, a fungus suspected of causing Yellow ring, a new and undescribed disease that plagues the sod industry of Illinois. The symptoms of the disease are a chlorotic (yellow) ring of grass plants usually several inches to several feet in radius. In the thatch beneath the grass, the fungus produces a dense, white mycelial mass. To date, this disease has been observed in Illinois, Wisconsin, Indiana, Iowa and Pennsylvania.

MICROBIAL AND EDAPHICAL STRESSES OF TURFGRASS

H. T. Wilkenson

Turfgrass may become plesionecrotic or necrotic as a result of attack by pathogenic microorganisms and/or edaphic stress. While these two factors are capable of causing the demise of turf, more often they act in consort. A disease such as Fusarium blight is an excellent example of how the interaction of microorganism(s) and the appropriate edaphic conditions combine to produce a devastating disease. I have started a research program to investigate how various edaphic stresses affect the growth of turfgrass in the absence of pathogens and how these same stresses condition the soil and turfgrass for attack by pathogens. The devastating disease, Fusarium blight, will be the principle disease of this investigation but, much of the research will be applicable to other stress-related diseases such as yellow patch and Nigrospora blight.

Fusarium blight usually appears on sodded turfgrass after 3-4 years as compared to 5-7 years for seeded lawns. Recently this disease has developed on 2 year old sodded lawns. I am investigating the importance of sod-soil interfacing and of the stress tolerance of different ages of sods to the occurrence of Fusarium blight. Preliminary results indicate that three-year-old peat or mineral sod is less hardy and interfaces with underlying soil poorly as compared to 1-2 year-old sods. I have also found that precoring the soil bed and filling the holes with various soil blends will increase the interfacing and vigor of sod.

The growth of turfgrass is very sensitive to elevated soil temperatures and will drastically reduce production of roots and rhizomes and increase the production of shoots. Fusarium blight usually occurs in mid-July through mid-September when soil tempertures are at their maximum. I am investigating the impact of elevated soil temperatures on the growth of turfgrass in the absence and presence of soil microorganisms. The objective is to determine if elevated soil temperatures predispose turfgrass to infection by ubiquitous soil pathogens such as <u>Fusarium</u> spp.

The causal organism of Fusarium blight is still unsubstantiated. I am investigating the possibility that there exists a group of facultative soil pathogens that act in consort to produce the symptoms of Fusarium blight. This resarch is being done with Dr. R. W. Smiley of Cornell University.

Several selective fungicides are being tested to determine the impact they have on reducing or preventing the development of Fusarium blight and the development of thatch. In addition, both spring-summer and fall applications are being made to determine when the destructive pathogens are infecting the turfgrass. This approach to determine those pathogens involved in Fusarium blight will require several years before specific pathogens can be identified as having a definitive role in this disease complex. This knowledge will eventually aid in our goal of a sound control program for Fusarium blight.

CONTROL OF TORONTO C-15 ON TORONTO BENTGRASS GREENS

H. T. Wilkinson

Toronto C-15 decline has been reported to be caused by a rickettsia-like bacterium (Roberts and Vargas, 1982) and controlled by repeated high concentration of tetracycline applied with large volumes of water.

The following research conducted in 1982 was undertaken to address two objectives: i) to maximize the control of C-15 decline by adjusting the rate and frequency of tetracycline applictions and by determining the most effective volume of water to use with bactericide applications; and ii) to determine if foliar applications of iron significantly reduce the development of the C-15 decline.

METHODS AND MATERIALS

Research site selection:

Three golf greens on the University of Illinois golf course with 5 to 25 percent disease was selected for study. These sites allow each treatment to be tested under different disease pressures and at different locations. This is important due to the different intensities of the decline that exist from one green to the next in Illinois. At each green, plots 5 x 6 feet were used and each treatment was replicated three times at each site in a random block design.

Procedures to complete objective number one:

All treatment sites received applications of Ridomil, Daconil, and Chipco 26019 in water. There were four different methods of applying tetracycline. The methods of application and treatments will be as follows:

1. 1200 and 1500 ppm/50 gal/1000 ft^2, applied every two weeks.
2. 1200 and 1500 ppm/25 gal/1000 ft^2, applied every two weeks.
3. 1200 and 1500 ppm/10 gal/1000 ft^2, applied every two weeks.

   Note: Each application was; i) used with no additional water; ii) 0.021 inches of water prior to application; iii) 0.21 inches of water following application.

Procedures to complete objective number two:

All treatment plots received the fungicides as described above for the tetracycline treatments. There were two different application methods and two iron compounds (ferrous sulfate and iron chelate-EDTA). The methods of application and the treatments were as follows:

1. 30 gms/1000 ft^2/10 gal., applied May 1 and June 1.
2. 30 gms/1000 ft^2/10 gal., applied May 1 and June 1.

   Note: For method 2, applications were immediately followed with 0.2 inch of water (overhead irrigation).

Preliminary analysis of our results indicate that the effectiveness of tetracycline as a bacteriostatic compound is conditioned on a minimum of 1200 ppm of tetracycline applied with a minimum of 25 gallons of water per 1000 ft^2. Irrigating the diseased turfgras with 0.2 inch of water prior to applying the tetracycline will produce temporary chlorosis of the turfgrass. Chlorosis appeared within a week following chemical application and lasted for several days. It was also observed that tetracycline generally arrests the development of disease symptoms but will not permanently eliminate future disease development. In summary, my observations indicate that control of Toronto C-15 decline with tetracycline is not a lasting control and that the effectiveness of the compound is conditioned on the application of substantial amounts of water. Iron treatments failed to arrest disease development.

RECOVERY OF TURFGRASS FROM INFECTION BY SCLEROTINIA HOMOEOCARPA

H. T. Wilkinson and M. C. Shurtleff

A balanced nutrient status in the soil and several commercially available fungicides will effectively arrest the development of dollar spot in turfgrass caused by S. homoeocarpa. The objective of this research is to determine what combined program of fertilization (nitrogen) and minimal fungicide application (rate and timing) will effectively arrest the development of dollar spot and optimally allow rapid recovery or growth of the turfgrass in those areas of infected plants. This two-year study involves three varieties of bentgrass (Penncross, Penneagle, and Toronto). The fungicides used are Bayleton, Acti-dione Thriam, Acti-dione TGF, Vorlan, Chipco 26019, Tersan 1991, Daconil 2787, Dyrene, and Fungo. In the 1982 test 1 lb. of 12-12-12 fertilizer was applied on July 16 to one-half of the treatments. In 1983 several fertilizer rates will be applied in combination with the fungicide treatments. Fungicides will be tested singly and as mixtures prepared with reduced rates of the component fungicides.

Results from the 1982 research strongly indicate that fertilizer in the absence of any pesticide can reduce the area of diseased turfgrass by about one-half compared to untreated turfgrass (Table 19). A reduction in disease development from fertilization could prevent or prolong the development of resistant strains of S. homeoeocarpa which result from the repeated use of fungicides. Secondly, several fungicides appear to be substantially more effective in arresting the pathogen and allowing the turfgrass to recover when used in combination with fertilizer. In the absence of added fertilizer, these same fungicides did not arrest the pathogen. Several of the fungicides tested resulted in both excellent recovery and arrest of the pathogen in the absence of additional fertilizer.

Table 19. Control and recovery of Toronto C-15 bentgrass infected by Sclerotinia homoeocarpa.

Fungicide (rate in oz/100 sq ft)		Mean percentage of area with dollar spot symptoms[1]					
		Fertilized			Non-fertilized		
		7-13	8-16	9-15	7-13	8-16	9-15
Bayleton	2.0	30	2	0	32	2	1
Acti-dione thiram	2.0	30	2	10	30	6	9
Acti-dione-TGF	2.0	30	2	6	34	8	30
Vorlan	4.0	31	5	tr	30	2	1
Chipco 26019	2.0	34	1	tr	31	1	1
Tersan 1991	2.0	27	36	97	36	68	98
Daconil 2787	11.0	31	3	2	30	11	14
Dyrene	8.0	32	5	44	39	16	66
Fungo 50	2.0	30	35	36	33	69	44
Check water only	--	31	24	43	32	41	54

[1]Fungicides were first applied on 7-13-82, one week later, and then every two weeks until 9-8-82. The rates of fungicides were based on an area of 1000 ft^2 and each treatment area was 4 x 5 ft. Mean percentages of treated areas with dollar spot symptoms was based on the average of four replicates. One pound of granular 12-12-12 fertilizer was applied on 7-16-82.

TURFGRASS GRUB CONTROL - 1982

Roscoe Randell, Extension Entomologist
University of Illinois

Annual white grubs, Cyclocephala immaculata were again a problem in turfgrass areas including home lawns, golf courses, and other highly managed grass areas.

The various labeled soil insecticides performed well in controlling annual white grubs if the chemical was drenched into the soil beneath the crown area. Oftanol 5G, labeled for use in Illinois and a few other states, controlled annual white grubs when either applied in the spring and summer as a preventative or in late summer as a rescue treatment to prevent further damage. Diazinon 14G, 5G, 2EC, and 4EC all performed well if applied after egg hatch in late July and immediately drenched into the soil. Trichlorfon (Proxol, Dylox 80S) controlled grubs effectively if applied as a control and watered in immediately. The combination of Sevin SP and Dursban 4E at half rates of each gave effective control of annual white grubs. Turcam 76WP was also effective on white grubs.

Five different replicated plots were established to determine effectiveness of the various chemicals listed above. Only one plot contained more than the economic damage level of grubs (12 per square foot) by mid September. Table 20 gives the results of comparing two formulations of Oftanol granules.

Other areas where damage was beginning to appear were treated with one of the labeled insecticides. All performed satisfactorily when the correct amount was used, the chemical was drenched into the soil, and results were evaluated after at least two, preferably three weeks after treatment.

In central Illinois, a few lawns were damaged in late June and July by the true white grub, Phyllophaga species. Oftanol and diazinon were used with good results.

Black turfgrass ataenius, Ataenius spretulus grubs attacked golf course fairways plus collars of greens and tees in 1982. These first generation ataenius grubs usually appear the last two weeks in June, but 1982 the life cycle was delayed 2 to 3 weeks due to below average soil temperatures. Replicated plots were established on two golf courses with a past history of ataenius activity. The results are given in Tables 21 and 22.

Many golf courses in the northern one third of the state were treated to prevent grub damage, some others were treated where the number of grubs exceed 40 to 50 per square foot and damage appeared in mid July. Oftanol, diazinon, and trichlorfon, when applied at the correct amount and watered in, were effective in reducing black turfgrass ataenius activity.

Oftanol 5G is labeled for use in Illinois in 1983 for grub and billbug control.

Table 20. Annual White Grub control plots - 1982.

Treatment[1]	Lb ai/A	No. of grubs/sq ft[2] 14 days	21 days
Diazinon 5G	6.0	3.3	2.0
Oftanol 5G	2.0	4.0	4.0
Oftanol 5G	1.5	4.7	3.3
Oftanol 2G	2.0	2.0	3.3
Oftanol 2G	1.5	8.0	4.0
Untreated	-	22.0	-

[1]Plot treated - September 23.

[2]Evaluated - October 6 and 13. Results are the average of 3 replicates of each treatment.

Table 21. Black turfgrass Ataenius control plot A - 1982.

Treatment[1]	Lb ai/A	Grubs/sq ft[2]
Oftanol 5G	2.0	2.0
Oftanol 2E	2.0	0.0
CG-12223 1G	2.0	11.0
Diazinon 5G	5.5	15.3
Untreated	-	61.0

[1]Plots treated - May 24.

[2]Evaluated - July 1. Grub counts are an average of three replicated.

Table 22. Black turfgrass Ataenius control plot B - 1982.

Treatment[1]	Lb ai/A	Grubs/sq ft[2]
Oftanol 5G	2.0	2.0
Oftanol 2E	2.0	0.0
Proxol 80S	8.0	12.0
Diazinon 5G	5.5	8.0
CG-12223 1G	2.0	18.0
Sevin 80S +	4 + 2	0.0
Dursban 4E	-	36.0

[1]Plots treated - May 25.

[2]Evaluated - July 8. Grub counts are an average of three replicates.

ANNUAL BLUEGRASS CONTROL IN CREEPING BENTGRASS

D. J. Wehner and J. E. Haley

Annual bluegrass (Poa annua) is often a major component of golf course turf. It competes well with creeping bentgrass and Kentucky bluegrass when irrigation is frequent, nitrogen levels are high, and mowing heights are low. Even when mowing heights are .25 inches or less, annual bluegrass is able to produce large amounts of seed. Though persistent, annual bluegrass is an undesirable golf turf. It is susceptible to winter damage and is difficult to maintain as a quality turf during the stressful summer months. The purpose of this study was to evaluate three pesticides as controls of annual bluegrass in a mature creeping bentgrass putting green.

The study was established May 24, 1982 in Urbana, IL. The north end of the experimental plot is a Penncross creeping bentgrass turf and the south end is a Toronto creeping bentgrass turf with 15% to 50% annual bluegrass infestation. The materials tested were a preemergence control herbicide, Prograss, at 1 and 2 lb a.i./A, and a postemergence herbicide, Rubigan, at 1 oz. and 2 oz. commercial formulation (c.f.)/1000 sq. ft. A growth regulator, EL-500, was evaluated at 1.25 lb. a.i./A alone and in combination with Rubigan at 1 oz. c.f./1000 sq. ft. and Rubigan at 2 oz. c.f./1000 sq ft. Dates of application are listed in Table 23. Plots are monitored for phytotoxicity and will be evaluated in the spring for percent of annual bluegrass per plot.

The results (Table 24) indicate that there was some reduction in annual bluegrass cover from May to September in all plots, including the check. The percent annual bluegrass is expected to decrease further during the next growing season. A better assessment can be made of the efficacy of these pesticides at that time. Prograss caused unacceptable phytotoxicity with the fall preemergence application. The higher quality rating found on the Rubigan plots resulted from the excellent control of dollarspot by this herbicide.

Table 23. Pesticide evaluation for the control of annual bluegrass in a creeping bentgrass turf - rates and application dates.

Treatment	Pesticide	Rate/Application Date[1]				
		5/24	6/21	7/18	8/23	9/30
1	Prograss	1	--	--	1	1
2	Prograss	2	--	--	2	2
3	Rubigan[2]	1 oz.	1 oz.	1 oz.	--	--
4	Rubigan[2]	2 oz.	2 oz.	1 oz.	--	--
5	EL 500	1.25	--	--	--	--
6	EL 500 +	1.25	--	--	--	--
	Rubigan[2]	1 oz.	1 oz.	1 oz.	--	--
7	EL 500 +	1.25	--	--	--	--
	Rubigan[2]	2 oz.	2 oz.	2 oz.	--	--
8	Control	--	--	--	--	--

[1]Rates of pesticide are given in lb. a.i./acre unless otherwise indicated.

[2]All rates of Rubigan are oz. of commercial formulation per acre.

Table 24. Control of annual bluegrass in a creeping bentgrass turf.[1]

		% Annual Bluegrass[2]		Toronto		Penncross		
	Rate			Phytotoxicity[3]	Quality[4]	Phytoxicity[3]		Quality[4]
Material	lb. ai./A	May	Sept.	11/4	8/17	9/23	11/4	8/17
Prograss	1	3.83	11.7	2.0d	5.7cd	4.3b	2.3b	6.0bc
Prograss	2	31.7	13.3	4.0c	6.7ab	3.7b	3.3b	6.0bc
Rubigan	1 oz. cf/ 1000 sq. ft.	35.0	15.0	7.0b	7.0a	7.7a	6.3a	7.7a
Rubigan	2 oz. cf/ 1000 sq. ft.	35.0	21.7	8.0ab	5.7cd	9.0a	6.7a	7.0ab
EL 500	1.25	26.7	11.7	7.0b	6.0b-d	7.7a	6.0a	5.7c
EL 500 + Rubigan	1.25 + 1 oz. cf/1000 sq. ft.	30.0	20.0	8.0ab	6.3a-c	8.3a	7.3a	8.0a
EL 500 + Rubigan	1.25 + 2 oz. cf/1000 sq. ft.	33.3	23.3	9.0a	6.3a-c	9.0a	7.3a	8.0a
Control		25.0	18.3	6.7b	5.3d	9.0a	5.7a	5.3c

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

[2]Percent annual bluegrass evaluations represent the average % cover with annual bluegrass for each treatment.

[3]Phytotoxicity evaluations are made on a 1-9 scale where 9 = no turfgrass injury and 1 = complete necrosis.

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

EVALUATION OF HERBICIDES FOR BROADLEAF WEED CONTROL IN TURF

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

The high cost of pesticide development has prohibited the introduction of new herbicides which are used exclusively for broadleaf weed control in turfgrass stands. Manufacturers are evaluating new formulations of standard turfgrass herbicides or seeking data to expand the label of products which have proven efficacious on large scale crops. The purpose of this research was to evaluate the herbicides 2,4-D, MCPP, dicamba, bromoxynil, MCPA, Glean and DPX-T6376 for control of broadleaf plantain (Plantago major L.), buckhorn plantain (Plantago lanceolate L.) and white clover (Trifolium repens L.) in a mixed Kentucky bluegrass (Poa pratensis L.) tall fescue (Festuca arundinacea Screb.) turfgrass stand. Treatments consisted of sprays containing individual herbicides or combinations of herbicides applied in 28 gallons of water per acre.

Weed control ratings taken 6 weeks after herbicide application on June 14 indicated that the best control of both plantain species was obtained with the herbicide 2,4-D alone or in combination with other herbicides (Table 25). The herbicide Glean did not control the plantain species present. The best control of white clover was found on plots treated with the herbicides MCPP and dicamba either alone or in combination. DPX-T6376 afforded excellent control of both plantains and white clover however this herbicide was significantly phytotoxic to the Kentucky bluegrass turf (Table 26). Glean at the highest rate tested controlled white clover but it also injured the bluegrass turf. Best control of both plantain species and white clover with a minimum of damage to the Kentucky bluegrass turf was obtained with the combination of 2,4-D, MCPP and dicamba.

Table 25. Post-emergence control of broadleaf weeds 6 weeks following herbicide application[1].

Material	Rate lb. ai./A	White Clover[2]	Plantain[2,3]
Control	---	8.0a	8.3a
Buctril	1	7.3a	7.0ab
Buctril	2	4.3bc	5.0cd
Buctril + Turf Kleen	1 + 2	6.7a	2.7e-h
Buctril + MCPP	1 + 1	6.0ab	5.3bc
Bronate	2	6.0ab	4.3c-e
Turf Kleen	2	6.0ab	3.0e-g
Glean*	.25 oz. ai./A	7.0a	8.3a
Glean*	.50 oz. ai./A	3.0c-e	7.7a
DPX T6376*	.125 oz. ai./A	1.0e	3.7c-f
DPX T6376*	.25 oz. ai./A	1.0e	1.0h
DPX T6376*	.375 oz. ai/A	1.0e	1.3gh
DPX T6376*	.50 oz. ai./A	1.0e	1.0h
DPX T6376*	.75 oz. ai./A	1.0e	1.0h
Daconate 6[4] + MCPP 2,4-D (1:1)	2 + 1.5, 1.5	1.0e	2.3fg
Daconate 6[4] + MCPP, 2,4-D (1:1)	2 + 1, 1	2.3c-e	2.3fg
2,4-D	1	7.3a	3.3d-f
MCPP	2	3.3cd	5.0cd
Dicamba	.25	2.3c-e	7.7a
2,4-D + MCPP + dicamba	1 + .5 + .25	1.7de	2.0f-h
Trexsan (2,4-D + MCPP + dicamba)	1.34 (.82 + .42 + .1)	2.0de	2.0f-h
MCPA	1	7.3a	5.0cd

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

[2]Weed evaluations are made on a 1-9 scale, where 9 = 100% weed population and 1 = no weeds present.

[3]Plantain evaluations represent control for both species of plantain present.

[4]A second application of Daconate 6 at lb. ai./A was made 10 days following the first.

*This herbicide was applied in a 0.1% solution by volume of surfactant WK.

Table 26. Phytotoxicity to Kentucky bluegrass from postemergence broadleaf weed herbicides.[1]

Material	Rate lb. ai./A	Phytoxicity Evaluation[2]
Control	---	9.0a
Buctril	1	9.0a
Buctril + Turf Kleen	1 + 2	9.0a
Bronate	2	9.0a
Glean*	.50 oz. ai./A	5.3c
DPX-T6376*	.125 oz. ai./A	5.0cd
DPX-T6376*	.375 oz. ai./A	4.0de
DPX-T6376*	.750 oz. ai./A	3.0e
Daconate 6 + MCPP, 2,4-D (1:1)	2 + 2	8.3a
2,4-D	1	8.0ab
MCPP	2	9.0a
Dicamba	.25	8.3a
Trexsan	1.34	7.0b
MCPA	1.0	8.7a

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

[2]Phytotoxicity evaluations are made on a 1-9 scale where 9 = no turfgrass injury and 1 = complete necrosis.

*This herbicide was applied in a 0.1% solution by volume of Surfactant WK.

GROWTH REGULATION OF KENTUCKY BLUEGRASS TURF

T. W. Fermanian and J. E. Haley

In recent years, many new chemical compounds have been evaluated for their ability to regulate turfgrass growth. The two components of growth most often affected are vegetative shoot growth and seedhead production. For many compounds the regulating effects on these two components have been inconsistent. In a continuing effort to evaluate potential growth regulators an experiment was developed to determine the efficacy of two growth regulators, mefluidide (Embark) and EL-500 on retarding Kentucky bluegrass growth.

In order to measure the effects of soil moisture levels on the efficacy of the regulators, the experiment was triplicated. One site received rainfall only, the second site was irrigated as needed to prevent wilt, and the third site was irrigated twice as long as the second site. Unfortunately, due to a very moist summer, no supplemental irrigation was required. The results reported, therefore, will be only from non-irrigated plots.

Growth regulation application was made on May 12, 1982. Embark was applied at a rate of 0.38 lb ai/A and EL 500 was applied at a rate of 1.25 lb ai/A. Treatments were made with a CO_2 propelled backpack sprayer at a spray volume of 40 gallons per acre. Plot size was 10' x 12' and each treatment was replicated three times. Turfgrass height was maintained at 5 cm with a rotary mower. Mowing was performed when the shoot height was 7.5 to 10.0 cm. The clippings removed evaluation (Table 27) was obtained as follows: When plots were mowed the turfgrass maintanence height of 5.0 cm was subtracted from the average height of the turfgrass canopy prior to mowing and these differences were added together for every mowing from 5/28 through 8/9, giving an average clipping removal per shoot for the season. It was found that both growth regulators had significantly less clippings removed in 10 weeks than the control. The frequency of mowing for the treated turf was significantly less than for the control. However there were no differences in clipping removal or mowing frequency between the two growth regulator treatments. Turfgrass treated with Embark had fewer seed heads produced than either the EL-500 treated turf or the control. Although there was no direct injury to the turfgrass from the growth regulators, the treated turf was slower to recover from environmental stresses than was the control.

Table 27. The evaluation of two plant growth regulators on a Kentucky bluegrass turf.[1]

Treatment	Rate lb. ai./A	Clippings removed[2] 5/28 - 8/29	Mowing frequency[3] 5/28 - 8/9	% seedhead reduction[4] 6/1
Embark	0.38	15.0b	4.3b	88.3a
EL-500	1.25	10.4b	2.7b	0b
Control	---	24.0a	6.7a	0b

[1]All values represent the mean of 3 replications. Means with the same letter are not significant at the 0.05 level as determined by Duncan's Multiple Range Test.

[2]Clippings removed refers to the average length in cm of shoot growth removed from 5/28 through 8/9.

[3]Mowing frequency represents the average number of mowings performed per treatment from 5/28 - 8/9.

[4]Percent seedhead reduction evaluations are made on a 0-100 scale where 0 = no reduction in seedheads produced and 100 = no seedheads present.

FAIRWAY RENOVATION WITH THE USE OF EMBARK AND ROUNDUP

C. Stynchula and D. J. Wehner

Kentucky bluegrass, bentgrass, and Poa annua are the major components of many golf course fairways in the Midwest. Establishing improved Kentucky bluegrass varieties in these fairways through overseeding is usually unsuccessful. Large scale overseeding is only feasable in the spring or fall. This is the optimum growing period for the seedling as well as the existing plants; resulting in a reduction in stand establishment. If a competitive disadvantage could be imposed on the existing grasses, more successful renovation programs may be accomplished. The purpose of this study is to evaluate the growth regulator mefluidide (Embark) as a tool in fairway renovation. By supressing the growth of the existing turf, it might be possible to increase the success of overseeding.

The field study was initiated on Sept. 20, 1982. Established stands of perennial ryegrass, bentgrass, and tall fescue were mowed at 5/8". Glyphosate and two applications rates of mefluidide (Embark) were applied to the plots. Glyphosate was applied at a rate of 2 lb ai/A for complete eradication of the pure stands. Embark was applied at two rates of 0.25 lb ai/A and 0.5 lb ai/A.

This application retarded growth of the existing stands. A time length of one week was allowed before renovation. Touchdown Kentucky bluegrass was broadcast over half the plots after areofication with a Ryan Greensaire. The seeding rate was 1 lb/1000 sq ft. A steel mat was used to break up the soil plugs and to drag seed into the holes. The second seeding method used a Rodger's seeder with slicer blades. The seeder was run one direction across the plots with the groove at 2" centers. The seeding rate was also 1 lb/100 sq ft. Preliminary data of germination showed seedling emergence in all plots.

Data collection will begin in the spring. Species differences will allow the density of Touchdown Kentucky bluegrass to be determined.

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
THU, APR 1, 82	62	34	48	42	56	46	0	100	28	NO DEW
FRI, APR 2, 82	70	45	48	40	50	40	0	80	30	
SAT, APR 3, 82	71	31	50	43	60	46	0.45	100	50	NO DEW
SUN, APR 4, 82	42	24	44	38	47	39	0	84	56	NO DEW
MON, APR 5, 82	40	31	43	36	46	39	0	88	54	NO DEW
TUE, APR 6, 82	36	17	40	36	40	38	0.5	100	64	NO DEW
WED, APR 7, 82	38	16	37	33	39	36	0	82	62	NO DEW
THU, APR 8, 82	32	20	35	34	37	35	0.1	100	54	NO DEW
FRI, APR 9, 82	33	25	35	34	35	34	0.45	100	96	NO DEW
SAT, APR 10, 82	42	24	35	34	36	35	0	100	74	NO DEW
SUN, APR 11, 82	46	28	38	34	45	36	0	100	50	NO DEW
MON, APR 12, 82	49	35	43	38	50	41	0	100	38	NO DEW
TUE, APR 13, 82	66	45	44	38	48	41	0	100	38	NO DEW
WED, APR 14, 82	51	33	44	41	48	44	0	100	72	LIGHT
THU, APR 15, 82	60	40	49	45	58	42	0	90	36	NO DEW
FRI, APR 16, 82	77	56	50	44	62	47	0.18	100	40	NO DEW
SAT, APR 17, 82	70	48	53	49	60	55	0.56	100	60	NO DEW
SUN, APR 18, 82	60	37	32	47	57	47	0	100	38	NO DEW
MON, APR 19, 82	63	40	52	47	60	50	0	100	32	NO DEW
TUE, APR 20, 82	62	45	50	48	54	50	0.21	100	50	NO DEW
WED, APR 21, 82	57	29	51	44	56	45	0	100	42	NO DEW
THU, APR 22, 82	53	39	51	45	59	44	0	69	30	NO DEW
FRI, APR 23, 82	59	35	51	45	58	43	0	92	26	NO DEW
SAT, APR 24, 82	65	40	50	46	62	58	0	88	26	NO DEW
SUN, APR 25, 82	69	44	52	46	66	51	0	100	22	NO DEW
MON, APR 26, 82	65	50	56	50	59	48	0	95	50	
TUE, APR 27, 82	70	36	54	48	64	54	0.05	100	46	NO DEW
WED, APR 28, 82	59	34	51	47	60	53	0	90	26	NO DEW
THU, APR 29, 82	63	42	51	47	60	53	0	90	24	NO DEW
FRI, APR 30, 82	67	45	51	47	58	54	0	100	39	NO DEW
TOTAL							2.5			
AVERAGE	56.6	35.6	46.3	42.2	53	44.8		94.9	45.1	
ACCUMULATIVE TOTAL							12.71			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
SAT, MAY 1, 82	66	50	52	48	60	55	0	100	60	NO DEW
SUN, MAY 2, 82	73	48	59	54	63	56	0	78	28	NO DEW
MON, MAY 3, 82	75	50	56	51	68	60	0	54	30	LIGHT
TUE, MAY 4, 82	78	56	56	51	68	60	0	78	24	NO DEW
WED, MAY 5, 82	80	59	57	54	68	61	0	74	40	NO DEW
THU, MAY 6, 82	86	63	57	54	60	54	0	90	36	NO DEW
FRI, MAY 7, 82	81	47	58	55	68	63	0.32	100	36	NO DEW
SAT, MAY 8, 82	69	44	58	53	68	61	0	100	40	LIGHT
SUN, MAY 9, 82	79	52	57	53	67	60	0	100	24	NO DEW
MON, MAY 10, 82	81	52	58	54	71	65	0	100	26	NO DEW
TUE, MAY 11, 82	81	52	58	54	72	64	0	100	28	LIGHT
WED, MAY 12, 82	84	56	59	55	73	64	0	100	28	LIGHT
THU, MAY 13, 82	86	57	63	56	73	65	0	92	30	NO DEW
FRI, MAY 14, 82	87	58	64	58	73	67	0	84	24	NO DEW
SAT, MAY 15, 82	86	59	65	58	78	63	0	100	28	MODERATE
SUN, MAY 16, 82	82	53	63	59	72	68	0.56	100	52	NO DEW
MON, MAY 17, 82	85	58	68	60	75	67	0	100	36	NO DEW
TUE, MAY 18, 82	88	60	68	61	72	65	0	100	42	NO DEW
WED, MAY 19, 82	82	63	66	62	77	69	0	100	38	NO DEW
THU, MAY 20, 82	84	58	67	62	78	70	0	100	34	NO DEW
FRI, MAY 21, 82	88	48	68	60	80	65	2.54	100	30	WET
SAT, MAY 22, 82	78	62	65	60	73	63	0	100	62	NO DEW
SUN, MAY 23, 82	68	54	65	60	73	63	0	100	72	NO DEW
MON, MAY 24, 82	65	57	63	60	70	63	0	100	70	MODERATE
TUE, MAY 25, 82	68	53	63	60	69	63	0	100	64	HEAVY
WED, MAY 26, 82	73	58	64	60	72	60	0.27	100	54	NO DEW
THU, MAY 27, 82	78	60	63	61	71	66	0.52	100	70	NO DEW
FRI, MAY 28, 82	74	57	64	62	72	61	0	100	66	MODERATE
SAT, MAY 29, 82	78	58	67	61	74	64	0.21	100	56	NO DEW
SUN, MAY 30, 82	78	63	67	65	72	69	0.1	100	70	NO DEW
MON, MAY 31, 82	78	63	67	65	72	69	0.1	100	70	NO DEW
TOTAL							4.62			
AVERAGE	78.7	55.7	62.1	57.6	71	63.3		95.2	44.1	
ACCUMULATIVE TOTAL							17.33			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
TUE, JUN 1, 82	80	54	71	64	76	67	1.53	100	68	LIGHT
WED, JUN 2, 82	68	52	71	63	75	65	0	100	44	MODERATE
THU, JUN 3, 82	73	49	70	65	77	65	0.01	100	40	NO DEW
FRI, JUN 4, 82	67	50	68	62	75	64	0.01	100	60	NO DEW
SAT, JUN 5, 82	62	46	66	60	64	56	0	94	64	
SUN, JUN 6, 82	74	51	67	60	74	62	0	100	46	MODERATE
MON, JUN 7, 82	78	61	68	64	80	66	0	100	44	LIGHT
TUE, JUN 8, 82	78	64	66	63	74	70	0.33	100	68	NO DEW
WED, JUN 9, 82	78	65	70	62	74	70	0.02	100	66	NO DEW
THU, JUN 10, 82	78	54	70	65	74	68	0.05	100	72	NO DEW
FRI, JUN 11, 82	78	48	72	67	76	63	0	95	50	
SAT, JUN 12, 82	76	54	72	65	77	66	0	76	32	
SUN, JUN 13, 82	75	57	70	65	77	69	0	100	30	NO DEW
MON, JUN 14, 82	78	52	74	67	78	65	0	94	44	
TUE, JUN 15, 82	80	64	70	62	83	70	0.01	98	28	NO DEW
WED, JUN 16, 82	83	52	68	65	76	68	1.39	100	62	NO DEW
THU, JUN 17, 82	65	47	65	61	69	65	0.05	100	56	HEAVY
FRI, JUN 18, 82	75	57	68	60	74	62	0	100	46	HEAVY
SAT, JUN 19, 82	69	55	68	65	75	66	0.75	100	52	NO DEW
SUN, JUN 20, 82	70	54	69	64	76	63	0	100	39	MODERATE
MON, JUN 21, 82	78	55	74	65	78	65	0	100	38	HEAVY
TUE, JUN 22, 82	77	50	76	65	76	63	0.1	100	45	
WED, JUN 23, 82	75	48	68	64	81	72	0	100	33	NO DEW
THU, JUN 24, 82	76	54	68	63	84	69	0	100	33	LIGHT
FRI, JUN 25, 82	78	59	70	63	84	69	0	100	36	LIGHT
SAT, JUN 26, 82	83	62	72	62	82	72	0	100	48	NO DEW
SUN, JUN 27, 82	84	67	72	68	82	76	0	100	60	LIGHT
MON, JUN 28, 82	83	67	75	68	78	65	0.1	100	70	
TUE, JUN 29, 82	80	64	75	70	80	70	0.66	100	70	HEAVY
WED, JUN 30, 82	86	58	77	70	83	72	0	100	61	NO DEW
TOTAL							5.01			
AVERAGE	76.2	55.7	70.3	64.2	77.1	66.8		98.6	50.2	
ACCUMULATIVE TOTAL							22.34			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
THU, JUL 1, 82	73	56	74	67	79	70	0	74	36	NO DEW
FRI, JUL 2, 82	73	57	72	67	79	69	0.1	100	44	NO DEW
SAT, JUL 3, 82	79	63	71	67	78	71	2.45	100	90	NO DEW
SUN, JUL 4, 82	83	70	73	69	76	70	0	100	80	LIGHT
MON, JUL 5, 82	90	67	78	71	85	71	0	100	55	LIGHT
TUE, JUL 6, 82	88	70	78	74	85	80	0	100	76	
WED, JUL 7, 82	89	72	78	71	87	80	0.01	100	64	LIGHT
THU, JUL 8, 82	85	64	80	73	90	79	0	100	54	LIGHT
FRI, JUL 9, 82	86	58	80	72	86	73	0	100	45	
SAT, JUL 10, 82	85	70	79	73	90	78	0.74	100	62	NO DEW
SUN, JUL 11, 82	82	65	76	72	82	76	0.09	100	78	MODERATE
MON, JUL 12, 82	75	60	74	70	78	72	0	100	66	HEAVY
TUE, JUL 13, 82	85	64	76	71	80	70	0	97	44	
WED, JUL 14, 82	84	64	76	70	82	74	0	100	60	LIGHT
THU, JUL 15, 82	83	65	77	71	85	75	0	100	60	MODERATE
FRI, JUL 16, 82	86	66	79	73	88	78	0	100	56	LIGHT
SAT, JUL 17, 82	88	71	78	73	85	79	0	100	64	LIGHT
SUN, JUL 18, 82	90	72	80	74	84	75	0	100	70	
MON, JUL 19, 82	83	68	77	71	84	80	0.61	100	88	NO DEW
TUE, JUL 20, 82	83	67	77	74	82	77	0	100	58	MODERATE
WED, JUL 21, 82	86	70	79	74	84	75	0	100	72	LIGHT
THU, JUL 22, 82	86	68	78	74	86	77	0.26	100	70	MODERATE
FRI, JUL 23, 82	80	68	78	75	80	72	0	95	60	
SAT, JUL 24, 82	81	65	76	71	80	72	0	100	50	LIGHT
SUN, JUL 25, 82	85	66	81	74	85	70	0	100	50	MODERATE
MON, JUL 26, 82	88	69	83	74	87	72	0	100	54	MODERATE
TUE, JUL 27, 82	88	67	83	75	87	72	0	96	57	
WED, JUL 28, 82	88	68	82	70	85	75	0	100	[illegible]	
THU, JUL 29, 82	82	58	80	70	82	72	0	100	50	
FRI, JUL 30, 82	82	62	78	71	85	78	0	100	46	HEAVY
SAT, JUL 31, 82	83	61	76	71	86	78	0	100	46	LIGHT
TOTAL							4.26			
AVERAGE	83.8	65.5	77.6	71.7	83.6	74.5		98.8	60.2	
ACCUMULATIVE TOTAL							26.6			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
SUN, AUG 1, 82	87	59	78	72	86	79	0	100	48	HEAVY
MON, AUG 2, 82	82	63	78	71	85	71	0	100	50	LIGHT
TUE, AUG 3, 82	91	64	79	71	90	75	0	100	44	LIGHT
WED, AUG 4, 82	91	72	82	75	88	73	0	100	60	
THU, AUG 5, 82	92	72	79	74	87	81	0	100	52	NO DEW
FRI, AUG 6, 82	85	69	78	75	89	81	1.03	100	80	HEAVY
SAT, AUG 7, 82	87	72	79	74	84	78	0	100	63	LIGHT
SUN, AUG 8, 82	85	70	78	73	83	75	0.11	100	56	MODERATE
MON, AUG 9, 82	85	60	78	73	83	75	0	100	74	MODERATE
TUE, AUG 10, 82	78	58	76	71	81	73	0.06	100	46	NO DEW
WED, AUG 11, 82	65	52	73	68	75	69	0.06	100	68	
THU, AUG 12, 82	73	52	71	66	78	68	0	100	42	LIGHT
FRI, AUG 13, 82	76	56	78	72	80	65	0	95	50	
SAT, AUG 14, 82	77	53	76	67	80	67	0	100	48	MODERATE
SUN, AUG 15, 82	81	62	70	68	85	75	0	100	40	MODERATE
MON, AUG 16, 82	82	63	73	70	83	79	0	100	58	NO DEW
TUE, AUG 17, 82	85	62	75	70	86	78	0	100	54	LIGHT
WED, AUG 18, 82	85	56	75	69	86	77	0	100	56	MODERATE
THU, AUG 19, 82	81	56	74	67	83	65	0	100	55	LIGHT
FRI, AUG 20, 82	84	63	72	67	85	73	0	100	46	LIGHT
SAT, AUG 21, 82	86	55	78	73	86	69	0	95	50	
SUN, AUG 22, 82	78	65	71	66	81	72	0	100	48	LIGHT
MON, AUG 23, 82	78	59	68	67	78	66	0	100	58	MODERATE
TUE, AUG 24, 82	77	56	70	66	75	70	0	100	58	MODERATE
WED, AUG 25, 82	81	58	73	68	79	65	1.4	96	66	
THU, AUG 26, 82	77	57	70	65	77	67	0	100	46	HEAVY
FRI, AUG 27, 82	74	59	66	64	71	67	0.06	100	64	HEAVY
SAT, AUG 28, 82	71	48	71	65	72	61	0	96	68	
SUN, AUG 29, 82	74	50	66	62	69	67	0	100	44	HEAVY
MON, AUG 30, 82	78	58	72	65	74	60	0.1	100	60	
TUE, AUG 31, 82	78	63	68	64	72	69	0.02	100	80	MODERATE
TOTAL							2.84			
AVERAGE	80.8	60.1	74	69	81	71.3		99.4	55.9	
ACCUMULATIVE TOTAL							29.44			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
WED, SEP 1, 82	81	71	70	65	74	69	0.18	100	81	MODERATE
THU, SEP 2, 82	85	69	71	67	76	70	0.72	100	75	MODERATE
FRI, SEP 3, 82	82	49	72	66	77	70	0	100	36	MODERATE
SAT, SEP 4, 82	76	49	71	64	73	68	0	100	34	MODERATE
SUN, SEP 5, 82	78	48	70	63	76	69	0	100	30	LIGHT
MON, SEP 6, 82	80	57	69	64	76	69	0	100	32	MODERATE
TUE, SEP 7, 82	74	60	67	64	71	69	0.01	100	68	HEAVY
WED, SEP 8, 82	76	56	69	65	75	70	0	100	60	HEAVY
THU, SEP 9, 82	78	57	70	65	77	68	0	100	48	HEAVY
FRI, SEP 10, 82	81	59	69	64	75	70	0	100	48	HEAVY
SAT, SEP 11, 82	85	59	70	65	78	71	0	100	46	LIGHT
SUN, SEP 12, 82	82	64	72	67	80	72	0	100	50	HEAVY
MON, SEP 13, 82	85	69	71	69	78	75	0.19	100	66	NO DEW
TUE, SEP 14, 82	80	64	75	68	76	68	0.1	100	65	
WED, SEP 15, 82	67	52	66	62	80	73	0.06	100	46	
THU, SEP 16, 82	80	54	72	66	77	70	0	100	60	NO DEW
FRI, SEP 17, 82	71	51	69	65	75	69	0	100	38	HEAVY
SAT, SEP 18, 82	76	55	72	66	75	61	0.5	100	65	
SUN, SEP 19, 82	69	42	70	63	71	58	0	95	38	
MON, SEP 20, 82	72	42	67	61	71	61	0	100	40	NO DEW
TUE, SEP 21, 82	65	41	62	56	67	60	0	100	46	LIGHT
WED, SEP 22, 82	61	45	68	59	64	54	0	100	48	
THU, SEP 23, 82	67	41	67	62	69	56	0	100	42	
FRI, SEP 24, 82	71	52	67	63	70	59	0.01	100	45	
SAT, SEP 25, 82	75	55	74	68	71	55	0	100	47	
SUN, SEP 26, 82	57	50	68	64	65	60	0	100	71	
MON, SEP 27, 82	66	49	60	56	65	60	0	100	58	MODERATE
TUE, SEP 28, 82	66	49	61	54	68	61	0	100	50	MODERATE
WED, SEP 29, 82	76	53	62	55	70	61	0	100	40	LIGHT
THU, SEP 30, 82	84	53	64	55	73	67	0	100	26	MODERATE
TOTAL							1.77			
AVERAGE	74.9	53.8	68.5	63	73.1	65.4		99.8	50	
ACCUMULATIVE TOTAL							31.21			

WEATHER DATA FOR URBANA STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
FRI, OCT 1, 82	85	53	66	60	75	66	0	100	34	LIGHT
SAT, OCT 2, 82	85	54	67	60	76	68	0	100	38	LIGHT
SUN, OCT 3, 82	82	56	66	62	74	69	0.01	100	42	LIGHT
MON, OCT 4, 82	76	48	72	63	75	60	0	100	40	
TUE, OCT 5, 82	70	59	71	66	71	66	0	100	62	
WED, OCT 6, 82	85	57	67	61	75	68	0	100	42	LIGHT
THU, OCT 7, 82	85	48	67	63	73	68	1.08	100	54	NO DEW
FRI, OCT 8, 82	70	48	69	62	70	58	0	95	36	
SAT, OCT 9, 82	80	56	65	61	70	63	0.17	100	60	
SUN, OCT 10, 82	82	47	68	61	74	66	0	100	44	LIGHT
MON, OCT 11, 82	68	44	63	57	68	61	0	100	36	LIGHT
TUE, OCT 12, 82	57	40	59	55	62	58	0	100	58	LIGHT
WED, OCT 13, 82	53	36	56	53	60	56	0	100	46	HEAVY
THU, OCT 14, 82	58	41	55	53	59	57	0	100	58	LIGHT
FRI, OCT 15, 82	59	45	54	51	59	55	0	100	50	LIGHT
SAT, OCT 16, 82	68	38	55	50	62	55	0	82	30	LIGHT
SUN, OCT 17, 82	60	34	53	50	60	54	0	100	34	MODERATE
MON, OCT 18, 82	61	39	52	49	60	55	0	100	36	NO DEW
TUE, OCT 19, 82	71	45	58	50	64	50	0	95	40	
WED, OCT 20, 82	70	46	53	50	62	55	0	100	28	
THU, OCT 21, 82	44	26	50	45	54	45	0	100	72	HEAVY
FRI, OCT 22, 82	40	26	46	42	46	43	0	100	68	HEAVY
SAT, OCT 23, 82	49	28	46	42	50	43	0	100	48	HEAVY
SUN, OCT 24, 82	54	28	47	42	50	43	0	100	46	MODERATE
MON, OCT 25, 82	56	31	47	44	52	46	0	100	40	MODERATE
TUE, OCT 26, 82	61	32	50	47	53	40	0	96	34	
WED, OCT 27, 82	63	36	49	45	55	47	0	92	32	MODERATE
THU, OCT 28, 82	64	42	47	44	55	48	0	84	36	
FRI, OCT 29, 82	69	50	54	47	59	52	0.09	100	46	NO DEW
SAT, OCT 30, 82	62	38	52	47	58	52	0	100	32	LIGHT
SUN, OCT 31, 82	56	51	58	53	60	48	0	100	45	
TOTAL							1.35			
AVERAGE	65.9	42.6	57.5	52.7	62.6	55.3		98.2	44.1	
ACCUMULATIVE TOTAL							32.56			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
SAT, MAY 1, 82	68	45	57	50	58	50	0	100	41	LIGHT
SUN, MAY 2, 82	75	51	60	52	62	53	0	98	27	LIGHT
MON, MAY 3, 82	76	51	64	56	68	60	0	94	30	HEAVY
TUE, MAY 4, 82	88	60	69	60	76	59	0	96	32	
WED, MAY 5, 82	88	60	72	62	81	62	0	80	43	NO DEW
THU, MAY 6, 82	90	64	74	66	82	67	0.37	90	64	
FRI, MAY 7, 82	78	44	68	58	70	56	0.05	100	50	
SAT, MAY 8, 82	86	48	62	59	65	56	0.6	98	48	
SUN, MAY 9, 82	80	47	72	59	81	58	0	100	32	LIGHT
MON, MAY 10, 82	84	51	75	62	82	61	0	96	27	LIGHT
TUE, MAY 11, 82	84	59	73	65	81	63	0	82	30	NO DEW
WED, MAY 12, 82	87	65	76	66	83	67	0	85	41	NO DEW
THU, MAY 13, 82	86	64	75	69	82	69	0	76	43	NO DEW
FRI, MAY 14, 82	87	60	76	69	82	68	0	88	42	NO DEW
SAT, MAY 15, 82	84	59	72	67	82	66	0	100	40	NO DEW
SUN, MAY 16, 82	81	56	73	68	81	64	0	100	39	
MON, MAY 17, 82	90	60	79	67	86	65	0	96	35	NO DEW
TUE, MAY 18, 82	82	56	82	72	88	70	0	100	50	
WED, MAY 19, 82	85	54	77	71	83	69	0	100	40	
THU, MAY 20, 82	91	57	76	69	82	68	0	100	40	LIGHT
FRI, MAY 21, 82	77	49	81	68	87	63	0.78	100	41	
SAT, MAY 22, 82	66	54	65	58	70	55	0	98	64	
SUN, MAY 23, 82	66	55	70	60	73	63	0	100	62	
MON, MAY 24, 82	73	56	75	65	80	62	0	100	62	MODERATE
TUE, MAY 25, 82	69	53	75	65	80	62	0	100	57	MODERATE
WED, MAY 26, 82	78	62	72	66	78	63	0.25	100	63	
THU, MAY 27, 82	78	60	75	66	79	63	0.67	100	60	HEAVY
FRI, MAY 28, 82	80	55	76	68	81	64	0.14	100	55	MODERATE
SAT, MAY 29, 82	73	65	76	67	83	66	0.1	100	78	
SUN, MAY 30, 82	80	62	69	64	74	63	0.25	100	64	
MON, MAY 31, 82	74	60	77	70	83	67	0.47	100	73	
TOTAL							3.68			
AVERAGE	80.1	56.2	72.4	64	78.2	62.6		96	47.5	
ACCUMULATIVE TOTAL							9.25			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
TUE, JUN 1, 82	71	50	70	64	72	58	0.16	100	48	
WED, JUN 2, 82	75	47	76	61	83	59	0	100	48	HEAVY
THU, JUN 3, 82	66	51	74	65	81	62	0	98	64	
FRI, JUN 4, 82	65	48	70	65	75	61	0.12	100	75	
SAT, JUN 5, 82	65	48	68	63	66	58	0	90	60	
SUN, JUN 6, 82	75	48	69	62	72	60	0	94	43	
MON, JUN 7, 82	78	65	80	63	87	57	0.11	95	45	
TUE, JUN 8, 82	79	60	78	73	84	70	0.6	100	60	
WED, JUN 9, 82	79	63	76	70	81	69	0.6	100	62	
THU, JUN 10, 82	79	55	70	65	72	62	0	100	55	
FRI, JUN 11, 82	76	51	79	65	86	62	0	100	50	
SAT, JUN 12, 82	78	60	73	67	78	66	0.01	100	50	
SUN, JUN 13, 82	77	54	74	66	76	64	0.01	98	48	
MON, JUN 14, 82	83	48	81	69	90	68	0	100	38	
TUE, JUN 15, 82	82	61	80	71	89	67	0	98	67	
WED, JUN 16, 82	73	57	77	72	82	68	0.5	100	50	
THU, JUN 17, 82	78	46	77	68	80	62	0.7	100	42	
FRI, JUN 18, 82	75	61	75	70	77	66	0	98	72	
SAT, JUN 19, 82	75	55	77	64	77	60	0.37	100	47	NO DEW
SUN, JUN 20, 82	81	51	79	69	85	65	0	99	37	MODERATE
MON, JUN 21, 82	81	48	80	69	87	67	0	100	36	
TUE, JUN 22, 82	78	59	82	68	89	67	0.09	100	40	
WED, JUN 23, 82	80	50	83	73	90	68	0	100	36	
THU, JUN 24, 82	83	51	82	69	90	68	0	100	35	
FRI, JUN 25, 82	89	51	83	73	89	68	0	90	54	
SAT, JUN 26, 82	83	60	80	74	86	72	0.06	100	64	
SUN, JUN 27, 82	86	62	79	75	85	71	0	98	64	
MON, JUN 28, 82	86	66	78	75	84	72	0.8	100	68	
TUE, JUN 29, 82	92	64	75	70	78	69	0.67	100	56	
WED, JUN 30, 82	88	60	78	65	80	63	0.1	100	60	
TOTAL							4.9			
AVERAGE	78.5	55	76.8	68.1	81.7	65		98.6	52.5	
ACCUMULATIVE TOTAL							14.15			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
THU, JUL 1, 82	75	57	82	74	87	71	0	90	50	
FRI, JUL 2, 82	84	59	78	73	84	70	0.67	100	78	
SAT, JUL 3, 82	87	65	78	72	81	69	1.32	100	68	
SUN, JUL 4, 82	93	66	81	72	84	70	0.17	100	46	
MON, JUL 5, 82	94	71	87	74	93	77	0	100	60	
TUE, JUL 6, 82	90	76	89	80	97	81	0	98	62	
WED, JUL 7, 82	89	70	89	81	97	81	0	96	48	
THU, JUL 8, 82	88	60	90	82	100	79	0	100	46	
FRI, JUL 9, 82	90	62	89	81	97	78	0	100	56	
SAT, JUL 10, 82	84	66	88	61	95	77	0	98	64	
SUN, JUL 11, 82	80	65	85	81	89	76	0	98	57	
MON, JUL 12, 82	88	58	82	78	86	73	0	100	44	
TUE, JUL 13, 82	88	65	87	77	93	72	0.13	100	53	
WED, JUL 14, 82	84	64	87	79	95	76	0	100	62	
THU, JUL 15, 82	90	68	84	79	91	76	0	96	53	
FRI, JUL 16, 82	90	72	88	80	95	78	0	95	63	
SAT, JUL 17, 82	95	74	86	81	90	80	0	99	56	
SUN, JUL 18, 82	86	69	90	81	96	78	0.55	100	77	
MON, JUL 19, 82	84	71	83	81	84	77	0.16	100	76	
TUE, JUL 20, 82	89	71	82	80	84	76	0.38	100	67	
WED, JUL 21, 82	90	73	90	79	95	75	0	100	68	
THU, JUL 22, 82	76	69	87	81	93	77	0.38	100	78	
FRI, JUL 23, 82	82	62	81	75	78	70	0	100	56	HEAVY
SAT, JUL 24, 82	85	61	82	70	84	69	0	100	52	MODERATE
SUN, JUL 25, 82	88	61	86	73	90	71	0	100	56	MODERATE
MON, JUL 26, 82	91	67	87	74	91	72	0	100	56	MODERATE
TUE, JUL 27, 82	92	68	88	74	96	69	0	100	57	
WED, JUL 28, 82	80	65	88	81	96	76	0.4	100	60	
THU, JUL 29, 82	82	54	80	70	82	72	0	100	57	
FRI, JUL 30, 82	84	58	88	78	92	72	0	100	44	
SAT, JUL 31, 82	86	57	87	77	95	73	0	100	48	MODERATE
TOTAL							4.16			
AVERAGE	86.6	65.3	85.5	77.4	90.6	74.5		99	58.6	
ACCUMULATIVE TOTAL							18.31			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
SUN, AUG 1, 82	88	57	85	78	94	74	0	100	50	
MON, AUG 2, 82	92	63	86	78	93	78	0	100	51	
TUE, AUG 3, 82	95	67	84	73	88	72	0	98	48	
WED, AUG 4, 82	93	76	90	79	97	81	0	93	54	
THU, AUG 5, 82	89	73	78	75	80	73	0	98	54	
FRI, AUG 6, 82	82	72	92	84	98	83	0	100	64	
SAT, AUG 7, 82	77	72	80	74	84	72	0	100	74	
SUN, AUG 8, 82	86	70	80	74	83	72	0	100	91	
MON, AUG 9, 82	77	56	82	82	85	68	0	100	45	
TUE, AUG 10, 82	58	57	80	73	84	65	0	100	46	
WED, AUG 11, 82	75	47	87	70	90	62	1.06	100	88	
THU, AUG 12, 82	76	47	80	67	85	62	0	100	47	
FRI, AUG 13, 82	79	58	78	72	80	65	0	100	50	
SAT, AUG 14, 82	82	58	76	65	80	66	0	100	56	
SUN, AUG 15, 82	85	67	82	70	90	63	0.2	100	53	
MON, AUG 16, 82	86	67	78	77	79	74	0	100	81	
TUE, AUG 17, 82	88	61	82	76	89	73	0	100	58	
WED, AUG 18, 82	85	55	78	74	85	70	0	100	56	
THU, AUG 19, 82	87	63	78	75	82	70	0	100	48	
FRI, AUG 20, 82	89	72	84	76	91	73	0	100	56	
SAT, AUG 21, 82	84	54	82	76	87	71	0.06	100	64	
SUN, AUG 22, 82	85	56	83	74	89	70	0	100	38	
MON, AUG 23, 82	82	61	78	75	83	72	0	100	68	
TUE, AUG 24, 82	80	60	75	70	80	68	0	100	62	
WED, AUG 25, 82	80	52	76	71	80	69	0	100	78	
THU, AUG 26, 82	71	52	80	71	81	66	0.42	100	46	
FRI, AUG 27, 82	71	62	74	67	80	64	0	100	78	
SAT, AUG 28, 82	73	54	72	65	74	63	0	100	86	
SUN, AUG 29, 82	80	50	70	64	73	59	0	100	50	
MON, AUG 30, 82	78	68	73	67	75	62	0	100	57	
TUE, AUG 31, 82	78	67	79	69	85	63	1.31	100	82	
TOTAL							3.05			
AVERAGE	81.6	61.1	80.1	72.9	84.6	69.1		99.6	60.6	
ACCUMULATIVE TOTAL							21.36			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
WED, SEP 1, 82	77	70	73	69	76	69	0.2	98	78	
THU, SEP 2, 82	86	60	75	70	78	68	0	100	60	
FRI, SEP 3, 82	82	51	78	69	80	66	0	100	35	MODERATE
SAT, SEP 4, 82	78	49	77	67	78	62	0	100	38	
SUN, SEP 5, 82	79	56	77	68	80	64	0	100	38	
MON, SEP 6, 82	80	63	77	70	80	68	0.05	97	46	
TUE, SEP 7, 82	71	61	75	69	74	65	0.15	98	58	
WED, SEP 8, 82	84	59	70	70	79	65	0	98	67	HEAVY
THU, SEP 9, 82	80	55	70	70	83	69	0	100	54	HEAVY
FRI, SEP 10, 82	84	63	80	68	85	66	0	100	45	MODERATE
SAT, SEP 11, 82	87	68	76	68	80	67	0	100	50	
SUN, SEP 12, 82	87	65	75	69	82	70	0	100	50	
MON, SEP 13, 82	89	66	77	70	88	70	0	100	65	LIGHT
TUE, SEP 14, 82	86	63	78	75	82	72	0.1	99	63	NO DEW
WED, SEP 15, 82	84	67	79	75	82	74	0.35	99	59	HEAVY
THU, SEP 16, 82	76	48	76	70	61	60	0	100	59	LIGHT
FRI, SEP 17, 82	75	52	76	66	63	61	0	100	40	MODERATE
SAT, SEP 18, 82	73	52	70	65	73	60	0.6	100	65	
SUN, SEP 19, 82	68	44	68	62	70	56	0	98	40	
MON, SEP 20, 82	77	43	74	69	80	79	2	95	40	LIGHT
TUE, SEP 21, 82	66	40	65	65	77	76	0	99	52	MODERATE
WED, SEP 22, 82	62	35	60	60	56	55	0	99	38	MODERATE
THU, SEP 23, 82	69	38	61	61	56	55	0	100	36	LIGHT
FRI, SEP 24, 82	70	38	61	61	65	57	0.06	100	46	LIGHT
SAT, SEP 25, 82	68	54	68	61	69	57	0	100	55	
SUN, SEP 26, 82	58	51	66	64	67	59	0	100	80	
MON, SEP 27, 82	74	43	66	62	72	58	0	100	65	HEAVY
TUE, SEP 28, 82	72	54	62	62	60	60	0	90	42	NO DEW
WED, SEP 29, 82	72	47	62	62	77	60	0	100	44	NO DEW
THU, SEP 30, 82	88	55	67	66	65	65	0	100	42	LIGHT
TOTAL							3.51			
AVERAGE	76.7	53.7	71.3	66.8	73.9	64.4		99	51.7	
ACCUMULATIVE TOTAL							24.87			

WEATHER DATA FOR KILBOURNE STATION

SOIL TEMPERATURE

DATE	TEMPERATURE MAX	TEMPERATURE MIN	GRASS MAX	GRASS MIN	SOIL MAX	SOIL MIN	PRECIPITATION (INCHES)	RELATIVE HUMIDITY MAX	RELATIVE HUMIDITY MIN	DEW
FRI, OCT 1, 82	85	56	70	65	78	61	0	96	40	
SAT, OCT 2, 82	85	52	70	64	76	62	0	100	50	
SUN, OCT 3, 82	80	52	70	62	77	60	0	100	45	
MON, OCT 4, 82	75	45	72	63	75	60	0	100	40	
TUE, OCT 5, 82	84	62	66	66	77	62	0	100	86	LIGHT
WED, OCT 6, 82	89	66	69	69	69	68	0	100	63	NO DEW
THU, OCT 7, 82	88	40	65	65	56	56	0.3	100	75	HEAVY
FRI, OCT 8, 82	76	50	65	65	72	57	0	100	38	MODERATE
SAT, OCT 9, 82	72	68	70	59	70	62	0.3	100	60	
SUN, OCT 10, 82	82	51	70	64	70	63	0	100	62	
MON, OCT 11, 82	63	52	63	63	76	76	0.2	98	60	NO DEW
TUE, OCT 12, 82	56	38	59	59	52	52	0	99	66	MODERATE
WED, OCT 13, 82	72	35	56	56	67	53	0	98	30	HEAVY
THU, OCT 14, 82	52	44	56	56	57	50	0	90	62	MODERATE
FRI, OCT 15, 82	65	44	56	56	66	51	0	91	46	LIGHT
SAT, OCT 16, 82	65	37	59	54	60	52	0	100	40	
SUN, OCT 17, 82	58	33	59	54	60	50	0	100	40	
MON, OCT 18, 82	71	34	56	56	50	50	0	100	35	LIGHT
TUE, OCT 19, 82	72	52	64	56	50	50	0.3	100	32	NO DEW
WED, OCT 20, 82	68	40	63	55	50	50	0.8	100	70	NO DEW
THU, OCT 21, 82	50	25	64	50	42	42	0	100	60	LIGHT
FRI, OCT 22, 82	50	20	47	47	50	50	0	100	54	HEAVY
SAT, OCT 23, 82	52	25	52	47	54	40	0	100	40	
SUN, OCT 24, 82	55	28	55	45	55	40	0	100	40	
MON, OCT 25, 82	56	26	52	45	54	40	0	100	40	
TUE, OCT 26, 82	61	32	52	47	55	43	0	98	36	
WED, OCT 27, 82	64	36	52	48	56	44	0	97	34	
THU, OCT 28, 82	62	51	54	50	56	50	0	85	35	
FRI, OCT 29, 82	72	46	55	48	59	47	0.1	100	43	
SAT, OCT 30, 82	64	48	57	54	60	49	0	100	45	
SUN, OCT 31, 82	65	54	58	53	60	48	0	100	45	
TOTAL							2			
AVERAGE	68	43.3	60.5	56.2	61.6	52.8		98.5	48.8	
ACCUMULATIVE TOTAL							26.87			