# 1994 Illinois Turfgrass Research Report

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# *FOREWORD*

The *1994 Illinois Turfgrass Research Report* presents the results of turfgrass research investigations conducted in Illinois during 1994. Contributors include scientists from the Departments of Horticulture and Plant Pathology at the University of Illinois and the Department of Crop and Soil Sciences at Southern Illinois University.

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

Jean Haley, Editor

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Illini F.S. Inc.
Illinois Lawn Equipment, Inc.
Illinois Natural History Survey
Illinois Nurseryman's Association
Illinois Turfgrass Foundation
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International Seeds, Inc.
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## *UNDERSTANDING THE DATA*

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

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

# *TURFGRASS CULTIVAR RESEARCH CONDUCTED BY THE UNIVERSITY OF ILLINOIS, URBANA, IL*

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

## National Turfgrass Evaluation Program (NTEP) Kentucky Bluegrass Cultivar Trial

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

| | |
|---|---|
| **Research Protocol:** | **Kentucky Bluegrass Cultivar Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL. |
| **Site Preparation:** | existing vegetation killed with Roundup, area worked with Ryan dethatcher; fertilized at 1 lb N/M. |
| **Seeding/ Establishment:** | seeding date - September 17, 1990; seeding rate - 2 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination. |
| **Plot Maintenance:** | mowing height - 1.8 inches; irrigation - to prevent wilt. |
| **1991** | pesticides - postemergence broadleaf weed herbicide; fertilization - 1 lb N/M/yr. |
| **1992** | pesticides - postemergence broadleaf weed herbicide; fertilization - 3 lb N/M/yr. |
| **1993** | pesticides - postemergence broadleaf weed herbicide; fertilization - 3.5 lb N/M/yr. |
| **1994** | pesticides - postemergence broadleaf weed herbicide; fertilization - 3.0 lb N/M/yr. |
| **Experimental Design:** | RCB; 3 replications. |

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

Evaluations of spring greenup, quality and disease performance during 1994 are listed in Table 1. Three Kentucky bluegrass cultivars that exhibited excellent spring greenup were 'Barblue,' 'Gemar' and 'Kenblue.' In early May quality ratings for most cultivars were fair. Those cultivars that displayed good or excellent quality during this time period were 'Ba 69-82,' 'Merit,' 'Ba 73-381,' 'Broadway, and 'H86-712.' Most turf quality declined during June, July and August. By early October quality ratings were poor to fair with the exception of 'H86-712,' 'Eagleton,' and 'PST-1DW.' Reduced performance was primarily the result of disease infection with several pathogens, including dollar spot (*Lanzia* spp. and *Moellerodiscus* spp.), brown patch (*Rhizoctonia* spp.) and necrotic ring spot (*Leptosphaeria korrae*). Cultivars 'Barmax,' 'Eclipse,' 'Monopoly,' 'PST-1DW,' and 'Eagleton' exhibited good to excellent resisitance to all disease organisms present. The site is also heavily contaminated with creeping bentgrass, making it impossible to evaluate many of the plots.

**Table 1.** The evaluation of Kentucky bluegrass cultivars during the 1994 growing season.[1]

| Cultivar | Spring Greenup[2] 4/1 | Quality[3] 5/3 | 6/9 | 7/17 | 8/19 | 10/4 | Disease Injury[4] 8/18 |
|---|---|---|---|---|---|---|---|
| A-34 | 4.7e-h | 6.3bc | 6.3h-l | 6.0e-j | 4.3c-g | 4.0a-g | 3.7a-g |
| Abbey | 5.0f-i | 6.0b | 3.0a-c | 3.0a-c | 2.7a-c | 3.0a-d | 2.7a-d |
| Able 1 | 4.7e-h | 6.3bc | 6.0g-l | 6.0e-j | 3.3a-e | 4.0a-g | 3.7a-g |
| Alpine | 2.3a | 6.0b | 7.7l-n | 5.3c-i | 5.0e-i | 5.7f-j | 5.0e-i |
| Ampellia | 5.7i-j | 6.0b | 6.7i-m | 4.3a-g | 3.3a-e | 4.3b-g | 4.3c-h |
| Aspen | 5.3g-j | 6.0b | 6.0g-l | 5.3c-i | 3.3a-e | 5.0d-i | 3.3a-f |
| Ba 69-82 | 3.3a-d | 6.7cd | 5.0d-i | 5.0b-i | 3.3a-e | 4.3b-g | 3.3a-f |
| Ba 70-131 | 3.0a-c | 6.0b | 6.7i-m | 6.3f-j | 4.3c-g | 3.7a-f | 4.3c-h |
| Ba 73-366 | 4.7e-h | 6.0b | 4.0a-f | 3.7a-e | 3.0a-d | 4.3b-g | 3.7a-g |
| Ba 73-381 | 4.7e-h | 6.7bc | 4.0a-f | 4.7b-h | 3.3a-e | 4.0a-g | 4.3c-h |
| Ba 73-382 | 5.0f-i | 6.0b | 3.7a-e | 4.7b-h | 3.3a-e | 4.0a-g | 4.0b-h |
| Allure (Ba 73-540) | 3.3a-d | 6.0b | 7.3k-n | 7.0h-j | 4.7d-h | 4.7c-h | 5.7g-j |
| Ba 74-114 | 5.3g-j | 6.0b | 2.3a | 3.0a-c | 2.3ab | 2.0a | 3.0a-e |
| Ba 76-305 | 5.0f-i | 6.0b | 5.3e-j | 7.0h-j | 4.3c-g | 5.7f-j | 4.7d-i |
| Ba 77-279 | 3.3a-d | 6.0b | 4.0a-f | 5.0b-i | 3.3a-e | 3.3a-e | 4.3c-h |
| Ba 77-292 | 4.3d-g | 6.0b | 3.7a-e | 4.7b-h | 3.0a-d | 3.3a-e | 4.0b-h |
| Ba 77-700 | 4.7e-h | 6.0b | 4.3b-g | 5.3c-i | 4.3c-g | 4.0a-g | 5.0e-i |
| Ba 78-258 | 4.7e-h | 6.0b | 5.0d-i | 5.0b-i | 3.0a-d | 4.0a-g | 4.0b-h |
| Banff | 6.0ij | 6.0b | 4.7c-h | 5.0b-i | 3.0a-d | 4.3b-g | 3.3a-f |
| BAR VB 1169 | 3.7b-e | 6.0b | 6.3h-l | 6.3f-j | 4.0b-g | 4.7c-h | 4.3c-h |
| BAR VB 1184 | 4.3d-g | 6.0b | 5.7f-k | 3.7a-e | 2.3ab | 3.0a-d | 2.7a-d |
| BAR VB 7037 | 4.7e-h | 6.0b | 3.7a-e | 5.0b-i | 3.7a-f | 4.7c-h | 3.7a-g |
| BAR VB 895 | 5.3g-j | 6.0b | 5.0d-i | 4.7b-h | 2.3ab | 4.3b-g | 3.3a-f |
| Barblue | 6.3j | 6.3bc | 5.3e-j | 5.7d-j | 3.0a-d | 3.7a-f | 3.7a-g |
| Barmax | 3.0a-c | 6.0b | 7.7l-n | 7.0h-j | 6.7ij | 4.7c-h | 6.7ij |
| Baron | 4.3d-g | 6.0b | 3.7a-e | 4.0a-f | 3.7a-f | 4.3b-g | 4.3c-h |
| Barsweet | 4.0c-f | 6.0b | 5.0d-i | 4.0a-f | 2.0a | 2.0a | 3.0a-e |
| Bartitia | 3.7b-e | 5.3a | 6.0g-l | 5.7d-j | 3.7a-f | 3.7a-f | 4.3c-h |
| Barzan | 3.7b-e | 6.3bc | 5.7f-k | 5.3c-i | 4.0b-g | 3.3a-e | 4.0b-h |
| Blacksburg | 3.7b-e | 6.0b | 7.0j-n | 7.3ij | 5.7g-j | 4.7c-h | 5.7g-j |
| Broadway | 5.0f-i | 7.0d | 6.7i-m | 4.7b-h | 3.7a-f | 4.3b-g | 4.0b-h |
| Cardiff | 4.7e-h | 6.0b | 5.0d-i | 5.0b-i | 4.0b-g | 4.3b-g | 5.0e-i |

*(continued)*

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

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

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

[4] Disease injury is made when a visual determination of a specific disease is not possible or when injury is the result of several diseases. Evaluations are made on a scale of 1-9 where 9 = no visible injury and 1 = turf necrosis as a result of disease infection to 90-100% of the plot area.

**Table 1.** The evaluation of Kentucky bluegrass cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | Disease Injury[4] |
|---|---|---|---|---|---|---|---|
| Cultivar | 4/1 | 5/3 | 6/9 | 7/17 | 8/19 | 10/4 | 8/18 |
| Challenger | 5.0f-i | 6.0b | 3.3a-d | 4.7b-h | 3.0a-d | 2.7a-c | 4.0b-h |
| Chelsea | 5.3g-j | 6.0b | 4.0a-f | 4.0a-f | 3.0a-d | 3.0a-d | 2.7a-d |
| Classic | 5.7h-j | 6.0b | 5.0d-i | 4.7b-h | 2.7a-c | 5.0d-i | 3.3a-f |
| Cobalt | 5.0f-i | 6.0b | 4.7c-h | 4.0a-f | 2.7a-c | 3.7a-f | 2.7a-d |
| Conni | 4.3d-g | 6.0b | 5.3e-j | 4.3a-g | 3.7a-f | 4.0a-g | 3.3a-f |
| Coventry | 3.3a-d | 6.0b | 6.0g-l | 7.3ij | 4.3c-g | 4.7c-h | 4.7d-i |
| Crest | 4.7e-h | 6.0b | 3.7a-e | 3.7a-e | 3.0a-d | 4.0a-g | 3.3a-f |
| Cultivar 1757 | 5.3g-j | 6.0b | 4.0a-f | 4.3a-g | 3.0a-d | 4.0a-g | 4.3c-h |
| Cultivar 602 | 4.0c-f | 6.0b | 7.3k-n | 6.7g-j | 4.7d-h | 5.0d-i | 4.7d-i |
| Cultivar 798 | 4.7e-h | 6.0b | 4.3b-g | 5.3c-i | 3.0a-d | 3.3a-e | 3.7a-g |
| Cynthia | 5.3g-j | 6.0b | 7.3k-n | 8.0j | 6.7ij | 4.0a-g | 5.7g-j |
| Dawn | 5.0f-i | 6.0b | 5.0d-i | 4.0a-f | 2.7a-c | 4.0a-g | 3.0a-e |
| Destiny | 5.3g-j | 6.0b | 3.3a-d | 3.7a-e | 2.7a-c | 3.3a-e | 3.3a-f |
| Donna | 5.0f-i | 6.0b | 3.7a-e | 3.7a-e | 3.0a-d | 3.7a-f | 3.0a-e |
| Eagleton | 4.7e-h | 6.0b | 4.7c-h | 8.0j | 7.3j | 7.0ij | 7.7j |
| Eclipse | 5.0f-i | 6.0b | 4.7c-h | 6.3f-j | 5.7g-j | 5.7f-j | 6.7ij |
| Estate | 3.0a-c | 6.3bc | 4.3b-g | 6.3f-j | 4.3c-g | 5.0d-i | 4.7d-i |
| EVB 13.703 | 4.3d-g | 6.0b | 4.7c-h | 5.7d-j | 5.0e-i | 5.3e-j | 5.0e-i |
| EVB 13.863 | 4.0c-f | 6.0b | 3.7a-e | 4.7b-h | 3.7a-f | 4.3b-g | 4.3c-h |
| Fortuna | 5.0f-i | 6.0b | 5.0d-i | 6.0e-j | 4.3c-g | 5.0d-i | 6.0h-j |
| Freedom | 5.7h-j | 6.0b | 4.3b-g | 3.7a-e | 3.0a-d | 4.7c-h | 3.3a-f |
| Gemar | 6.3j | 6.0b | 3.0a-c | 6.3f-j | 5.0e-i | 5.3e-j | 5.0e-i |
| Georgetown | 5.7h-j | 6.0b | 4.7c-h | 4.0a-f | 3.0a-d | 3.7a-f | 2.7a-d |
| Ginger | 6.0ij | 6.0b | 3.0a-c | 4.0a-f | 2.7a-c | 3.3a-e | 3.0a-e |
| Glade | 4.7e-h | 6.0b | 6.3h-l | 6.3f-j | 4.0b-g | 4.0a-g | 3.7a-g |
| Gnome | 5.0f-i | 6.0b | 3.7a-e | 4.3a-g | 3.0a-d | 3.7a-f | 3.3a-f |
| Greenley | 6.0ij | 6.0b | 2.7ab | 3.7a-e | 2.7a-c | 3.0a-d | 3.0a-e |
| H86-712 | 5.3g-j | 8.0e | 7.7l-n | 5.3c-i | 4.3c-g | 6.7h-j | 5.0e-i |
| Haga | 5.7h-j | 6.0b | 5.3e-j | 5.0b-i | 2.7a-c | 6.0g-j | 3.0a-e |
| HV 125 | 5.0f-i | 6.0b | 5.0d-i | 3.3a-d | 3.3a-e | 3.3a-e | 3.7a-g |
| Indigo | 5.0f-i | 6.0b | 3.3a-d | 3.3a-d | 3.0a-d | 3.0a-d | 3.0a-e |
| J-229 | 4.7e-h | 6.0b | 6.0g-l | 4.0a-f | 3.0a-d | 5.3e-j | 3.0a-e |

*(continued)*

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

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

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

[4] Disease injury is made when a visual determination of a specific disease is not possible or when injury is the result of several diseases. Evaluations are made on a scale of 1-9 where 9 = no visible injury and 1 = turf necrosis as a result of disease infection to 90-100% of the plot area.

**Table 1.** The evaluation of Kentucky bluegrass cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | Disease Injury[4] |
|---|---|---|---|---|---|---|---|
| Cultivar | 4/1 | 5/3 | 6/9 | 7/17 | 8/19 | 10/4 | 8/18 |
| J-333 | 5.0f-i | 6.0b | 7.0j-n | 6.7g-j | 4.7d-h | 3.7a-f | 5.0e-i |
| J-335 | 3.3a-d | 6.0b | 6.7i-m | 6.7g-j | 5.0e-i | 5.7f-j | 5.0e-i |
| J-386 | 5.7h-j | 6.0b | 4.7c-h | 7.3ij | 4.7d-h | 6.0g-j | 5.3f-i |
| J11-94 | 5.0f-i | 6.0b | 4.3b-g | 3.7a-e | 2.7a-c | 2.7a-c | 2.7a-d |
| J13-152 | 4.7e-h | 6.0b | 3.7a-e | 4.3a-g | 3.0a-d | 4.3b-g | 3.3a-f |
| J34-99 | 5.3g-j | 6.0b | 4.0a-f | 3.7a-e | 2.7a-c | 3.7a-f | 3.0a-e |
| Julia | 4.7e-h | 6.0b | 6.0g-l | 5.3c-i | 4.3c-g | 3.7a-f | 4.7d-i |
| Kelly | 4.7e-h | 6.0b | 5.3e-j | 5.0b-i | 3.3a-e | 3.7a-f | 3.7a-g |
| Kenblue | 6.3j | 6.0b | 3.3a-d | 4.7b-h | 3.0a-d | 3.7a-f | 3.7a-g |
| KWS Pp 13-2 | 4.3d-g | 6.0b | 3.7a-e | 3.7a-e | 2.7a-c | 3.0a-d | 3.0a-e |
| Liberty | 4.3d-g | 6.0b | 5.3e-j | 4.3a-g | 2.3ab | 4.0a-g | 3.0a-e |
| Limousine | 3.7b-e | 6.0b | 7.0j-n | 6.3f-j | 5.3f-i | 4.7c-h | 5.7g-i |
| Livingston | 5.7h-j | 6.0b | 4.7c-h | 5.7d-j | 4.7d-h | 5.7f-j | 5.3f-i |
| Marquis | 5.0f-i | 6.0b | 4.3b-g | 5.7d-j | 2.7a-c | 3.7a-f | 4.7d-i |
| Melba | 5.3g-j | 6.0b | 6.3h-l | 5.0b-i | 4.0b-g | 5.3e-j | 5.0e-i |
| Merion | 4.0c-f | 6.0b | 3.0a-c | 3.7a-e | 3.3a-e | 3.3a-e | 3.7a-g |
| Merit | 5.0f-i | 6.7cd | 3.7a-e | 6.0e-j | 3.7a-f | 5.0d-i | 5.0e-i |
| Midnight | 3.7b-e | 6.0b | 5.3e-j | 5.7d-j | 3.7a-f | 4.7c-h | 5.0e-i |
| Minstrel | 5.0f-i | 6.3bc | 4.3b-g | 6.0e-j | 3.3a-e | 4.7c-h | 4.7d-i |
| Miracle | 5.0f-i | 6.0b | 4.0a-f | 2.7ab | 3.0a-d | 3.7a-f | 3.3a-f |
| Miranda | 4.3d-g | 6.0b | 5.0d-i | 2.7ab | 2.3ab | 4.0a-g | 2.3a-c |
| Monopoly | 4.7e-h | 5.3a | 6.0g-l | 8.0j | 6.3h-j | 5.7f-j | 6.7ij |
| Nassau | 5.7h-j | 6.0b | 3.3a-d | 3.7a-e | 2.7a-c | 2.7a-c | 2.3a-c |
| NE 80-47 | 5.3g-j | 6.0b | 3.7a-e | 4.3a-g | 3.0a-d | 4.7c-h | 3.7a-g |
| Noblesse | 4.3d-g | 6.0b | 3.0a-c | 3.0a-c | 2.7a-c | 3.0a-d | 3.3a-f |
| NuStar | 3.0a-c | 6.0b | 5.3e-j | 4.7b-h | 4.3c-g | 4.0a-g | 4.7d-i |
| Opal | 5.0f-i | 6.0b | 5.0d-i | 5.7d-j | 4.7d-h | 3.0a-d | 5.7g-i |
| Platini | 3.7b-e | 6.0b | 6.7i-m | 4.7b-h | 3.7a-f | 3.7a-f | 4.3c-h |
| PR-1 | 5.0f-i | 6.0b | 5.0d-i | 2.0a | 2.0a | 3.7a-f | 2.0ab |
| Princeton 104 | 5.0f-i | 6.0b | 6.7i-m | 6.0e-j | 4.7d-h | 4.3b-g | 5.0e-i |
| PST-0514 | 4.0c-f | 6.0b | 6.0g-l | 6.0e-j | 3.3a-e | 3.7a-f | 3.7a-g |

*(continued)*

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

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

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

[4] Disease injury is made when a visual determination of a specific disease is not possible or when injury is the result of several diseases. Evaluations are made on a scale of 1-9 where 9 = no visible injury and 1 = turf necrosis as a result of disease infection to 90-100% of the plot area.

**Table 1.** The evaluation of Kentucky bluegrass cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | Disease Injury[4] |
|---|---|---|---|---|---|---|---|
| Cultivar | 4/1 | 5/3 | 6/9 | 7/17 | 8/19 | 10/4 | 8/18 |
| PST-1DW | 2.7ab | 6.0b | 8.3mn | 7.3ij | 6.7ij | 7.3j | 6.7ij |
| PST-A7-1877 | 4.0c-f | 6.0b | 5.3e-j | 6.0e-j | 3.3a-e | 3.0a-d | 3.7a-g |
| PST-A7-341 | 5.0f-i | 6.0b | 4.0a-f | 5.3c-i | 3.3a-e | 3.7a-f | 3.7a-g |
| PST-A84-405 | 4.3d-g | 6.0b | 4.3b-g | 5.0b-i | 3.0a-d | 4.3b-g | 4.3c-h |
| PST-A84-803 | 5.3g-i | 6.0b | 4.3b-g | 3.7a-e | 3.0a-d | 3.0a-d | 3.0a-e |
| PST-A84-928 | 4.7e-h | 6.0b | 4.0a-f | 3.7a-e | 2.7a-c | 2.3ab | 3.7a-g |
| PST-B8-106 | 3.7b-e | 6.0b | 6.7i-m | 5.3c-i | 3.3a-e | 3.3a-e | 3.3a-f |
| PST-B8-13 | 5.0f-i | 6.0b | 3.7a-e | 3.7a-e | 3.7a-f | 3.7a-f | 3.7a-g |
| PST-C-224 | 3.3a-d | 6.3bc | 5.7f-k | 5.3c-i | 4.3c-g | 5.3e-j | 5.3f-i |
| PST-C-76 | 4.0c-f | 6.0b | 5.0d-i | 5.7d-j | 3.7a-f | 4.0a-g | 3.7a-g |
| PST-HV-116 | 5.0f-i | 6.0b | 5.3e-j | 5.0b-i | 3.7a-f | 4.0a-g | 4.0b-h |
| PST-R-740 | 4.7e-h | 6.0b | 4.0a-f | 3.7a-e | 3.0a-d | 2.7a-c | 2.7a-d |
| PST-RE-88 | 5.0f-i | 6.0b | 5.0d-i | 5.3c-i | 3.7a-f | 4.3b-g | 5.3f-i |
| PST-UD-10 | 5.7h-i | 6.0b | 4.7c-h | 6.0e-j | 3.7a-f | 6.0g-j | 4.7d-i |
| PST-UD-12 | 4.7e-h | 6.0b | 4.3b-g | 4.3a-g | 3.3a-e | 4.0a-g | 4.3c-h |
| PSU-151 | 5.0f-i | 6.0b | 6.7i-m | 6.7g-j | 4.7d-h | 5.3e-j | 4.7d-i |
| R751A | 4.7e-h | 6.0b | 4.0a-f | 4.0a-f | 2.0a | 3.0a-d | 2.0ab |
| Ram-1 | 4.7e-h | 6.0b | 4.7c-h | 3.7a-e | 2.3ab | 2.7a-c | 3.0a-e |
| Ronde | 5.3g-i | 6.0b | 3.3a-d | 4.7b-h | 3.0a-d | 4.0a-g | 3.3a-f |
| Silvia | 4.7e-h | 6.0b | 4.0a-f | 3.3a-d | 3.0a-d | 2.7a-c | 2.7a-d |
| South Dakota | 6.0ij | 6.0b | 3.0a-c | 4.7b-h | 3.7a-f | 3.0a-d | 3.3a-f |
| SR 2000 | 4.3d-g | 6.0b | 5.7f-k | 6.3f-j | 5.3f-i | 4.3b-g | 6.0h-j |
| SR 2100 | 3.7b-e | 6.0b | 6.3h-l | 3.7a-e | 2.7a-c | 3.7a-f | 2.7a-d |
| Suffolk | 5.3g-i | 6.0b | 4.7c-h | 4.3a-g | 3.3a-e | 4.3b-g | 4.0b-h |
| Summit | 2.3a | 6.0b | 8.7n | 7.3ij | 6.7ij | 5.7f-j | 6.0h-j |
| Touchdown | 5.7h-i | 5.3a | 7.0j-n | 3.0a-c | 2.7a-c | 3.0a-d | 3.0a-e |
| Trampas | 4.7e-h | 6.0b | 5.7f-k | 3.3a-d | 2.3ab | 2.7a-c | 2.3a-c |
| Trenton | 5.3g-i | 6.0b | 4.7c-h | 3.0a-v | 2.0a | 3.0a-d | 1.7a |
| Washington | 6.0ij | 6.0b | 6.3h-l | 6.3f-j | 5.3f-i | 4.7c-h | 5.3f-i |
| WW Ag 505 | 4.0c-f | 6.0b | 6.0g-l | 7.0h-j | 5.7g-j | 4.0a-g | 6.0h-j |
| WW Ag 508 | 4.7e-h | 6.0b | 6.0g-l | 6.3f-j | 3.7a-f | 5.0d-i | 5.0e-i |

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

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

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

[4] Disease injury is made when a visual determination of a specific disease is not possible or when injury is the result of several diseases. Evaluations are made on a scale of 1-9 where 9 = no visible injury and 1 = turf necrosis as a result of disease infection to 90-100% of the plot area.

# NTEP Perennial Ryegrass Cultivar Trial

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

| | |
|---|---|
| **Research Protocol:** | **Perennial Ryegrass Cultivar Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | treated with Roundup - August 3, 1994; fumigated with methyl bromide - September 9, 1994; rototilled and graded. |
| **Seeding/ Establishment:** | seeding date - September 21, 1994; seeding rate - 5 lbs seed/M; plot size - 5 ft x 5 ft; mulched - Seed Guard™; fertilized at 1 lb N/M; irrigation - to insure germination. |
| **Plot Maintenance:** | mowing height - 2.5 inches; irrigation - to prevent wilt. |
| **Experimental Design:** | RCB; 3 replications. |

Perennial ryegrass (*Lolium perenne* Linnaeus) is included in seed mixtures as a temporary lawn or nursegrass, however it can persist for a number of years. In central Illinois it is used on many golf course fairways and is overseeded annually. It is also used in athletic fields with Kentucky bluegrass. In Illinois, deterioration of turf during summer months has prevented perennial ryegrass from becoming an important permanent turfgrass. Improved cultivars with better color, density, mowing quality, and disease resistance have challenged the traditional image of perennial ryegrass. The turf program at the University of Illinois is participating in a NTEP perennial ryegrass trial. This nationwide test evaluates the performance of 96 perennial ryegrass cultivars under a broad range of climatic and cultural conditions. Two additional cultivars are also included in the test.

Seedling vigor varied among cultivars from fair to excellent (Table 2). Cultivars exhibiting excellent seedling vigor are 'Quickstart,' 'DSV NA 9402,' 'Assure,' 'Express,' 'Advantage,' 'SR 4200,' 'Figaro,' 'Top Hat,' 'ISI-R2,' and 'Accent.'

**Table 2.** The evaluation of seedling vigor of 98 perennial ryegrass cultivars planted September 21, 1994.[1]

| | Seedling Vigor[2] | | | | |
|---|---|---|---|---|---|
| Cultivar | 10-04 | Cultivar | 10-04 | Cultivar | 10-04 |
| Accent | 7.3g | Linn | 6.3d-g | PSI-E-1 | 6.7e-g |
| Achiever | 5.3a-d | LRF-94-B6 | 5.0a-c | PST-28M | 5.7b-e |
| Advantage | 7.0fg | LRF-94-C7 | 4.7ab | PST-2CB | 6.0c-f |
| APR 066 | 6.7e-g | LRF-94-C8 | 4.3a | PST-2DGR | 5.0a-c |
| APR 106 | 6.3d-g | LRF-94-MPRH | 5.3a-d | PST-2DLM | 6.0c-f |
| APR 124 | 5.0a-c | Manhattan III | 5.0a-c | PST-2ET | 5.7b-e |
| APR 131 | 6.3d-g | MB 1-5 | 5.3a-d | PST-2FE | 5.3a-d |
| Assure | 7.0fg | MB 41 | 6.0c-f | PST-2FF | 6.3d-g |
| BAR Er 5813 | 5.7b-e | MB 42 | 5.0a-c | PST-2M3 | 5.0a-c |
| BAR USA 94-11 | 5.3a-d | MB 43 | 6.0c-f | PST-2R3 | 5.7b-e |
| Brightstar | 6.3d-g | MB 44 | 4.7ab | PST-GH-94 | 5.3a-d |
| Calypso II | 6.0c-f | MB 45 | 5.7b-e | Quickstart | 7.0fg |
| CAS-LP23 | 5.3a-d | MB 46 | 5.0a-c | Riviera II | 6.3d-g |
| Cutter | 6.0c-f | MB 47 | 6.0c-f | RPBD | 6.0c-f |
| Dancer | 6.7e-g | MED 5071 | 4.7ab | Saturn | 6.7e-g |
| Divine | 5.3a-d | Morning Star | 6.7e-g | SR 4200 | 7.0fg |
| DOP 1305 | 6.7e-g | MVF-4-1 | 6.0c-f | SRX 4010 | 5.7b-e |
| DSV NA 9401 | 5.7b-e | Navajo | 5.7b-e | SRX 4400 | 6.0c-f |
| DSV NA 9402 | 7.0fg | Night Hawk | 5.3a-d | Stallion Select | 5.3a-d |
| Edge | 6.7e-g | Nine-O-One | 5.3a-d | TMI-EXFLP94 | 6.0c-f |
| Elf | 6.0c-f | Nobility | 6.3d-g | Top Hat | 7.3g |
| Esquire | 5.7b-e | OFI-DM | 5.0a-c | Vivid | 5.7b-e |
| Express | 7.0fg | OFI-et | 5.0a-c | Williamsburg | 6.3d-g |
| Figaro | 7.0fg | Omni | 5.7b-e | WVPB 92-4 | 6.7e-g |
| Imagine | 5.7b-e | PC-93-1 | 6.0c-f | WVPB-93-KFK | 6.0c-f |
| ISI-MHB | 6.7e-g | Pegasus | 6.7e-g | WVPB-PR-C-2 | 5.7b-e |
| ISI-R2 | 7.3g | Pennfine | 6.7e-g | WX3-91 | 5.3a-d |
| J-1703 | 5.3a-d | Pick 928 | 6.7e-g | WX3-93 | 4.7ab |
| J-1706 | 6.0c-f | Pick Lp 102-92 | 5.0a-c | ZPS-2DR-94 | 5.0a-c |
| Koos 93-3 | 5.3a-d | Pick PR 84-91 | 4.7ab | ZPS-2NV | 6.0c-f |
| Koos 93-6 | 6.3d-g | Precision | 6.0c-f | ZPS-2ST | 5.0a-c |
| Laredo | 5.0a-c | Prizm | 5.7b-e | ZPS-PR1 | 5.0a-c |
| LESCO-TWF | 4.7ab | PS-D-9 | 6.7e-g | | |

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

[2]Seedling vigor is a visual estimate based on percent ground cover, plant height, etc., and reflects the relative speed at which an entry develops into mature sod. The evaluations are made on a 1-9 scale where 9 = excellent seedling vigor and 1 = very poor seedling vigor.

# NTEP Tall Fescue Cultivar Trial

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

| | |
|---|---|
| **Research Protocol:** | **NTEP Tall Fescue Cultivar Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL. |
| **Site Preparation:** | existing vegetation killed with Roundup; area worked with Ryan dethatcher; fertilized at 1 lb N/M. |
| **Seeding/ Establishment:** | seeding date - September 4, 1992; seeding rate - 4 lbs seed/M; plot size - 5 ft x 6 ft; irrigation - to insure germination. |
| **Plot Maintenance:** | mowing height - 2.5 inches; irrigation - to prevent wilt. |
| **1992** | pesticides - none; fertilization - 1.5 lbs N/M/yr. |
| **1993** | pesticides - postemergence broadleaf weed control herbicide; fertilization - 2.0 lbs N/M/yr. |
| **1994** | pesticides - postemergence broadleaf weed control herbicide; fertilization - 1.0 lbs N/M/yr. |
| **Experimental Design:** | RCB; 3 replications. |

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

The tall fescue cultivars were seeded on September 4, 1992. Tall fescue cultivars were evaluated for spring greenup, turfgrass quality, genetic color and texture in 1994 (Table 3). Cultivars that exhibited excellent spring greenup were 'Phoenix,' 'Anthem,' 'Arid,' 'Kentucky 31,' with and without endophytes, and 'Falcon.' In late April, tall fescue quality was evaluated fair to excellent for most cultivars. Quality remained high throughout the growing season. Two cultivars, 'PST-5DX' with endophyte and 'BAR Fa 214' received texture ratings of 6.7 (1 - 9 scale where 1 = an extremely course turf and 9 = a very fine turf). Only 11 cultivars had color evaluations of 6 or less (1 - 9 scale where 1 = tan colored turf and 9 = dark green turf).

**Table 3.** The evaluation of tall fescue cultivars during the 1994 growing season.[1]

| Cultivar | Spring Greenup[2] 4/18 | Quality[3] 4/29 | 6/10 | 7/26 | 8/23 | 10/10 | Texture[4] 10/10 | Color[5] 10/11 |
|---|---|---|---|---|---|---|---|---|
| 5DC | 5.0ab | 5.3a-c | 6.7c-f | 6.0a-e | 4.3a | 6.7c-g | 5.0a-c | 8.0gh |
| 5EX | 5.7a-d | 5.7a-d | 6.3b-e | 6.3b-f | 5.7a-e | 6.0a-e | 5.3b-d | 7.7f-h |
| 5MX | 5.0ab | 6.7c-g | 7.0d-g | 7.0d-f | 6.7d-h | 7.7f-h | 5.7b-e | 7.7f-h |
| 5PVC | 5.7a-d | 6.7c-g | 6.7c-f | 5.7a-d | 7.3f-i | 7.0d-h | 5.7b-e | 7.3e-h |
| Anthem | 8.0h-j | 5.3a-c | 6.3b-e | 4.7a | 6.3c-g | 6.3b-f | 4.7ab | 5.3ab |
| Arid | 7.7g-i | 5.7a-d | 5.3ab | 6.0a-e | 5.7a-e | 6.3b-f | 5.7b-e | 6.0b-d |
| Astro 2000 | 6.7d-g | 6.7c-g | 6.0b-d | 5.7a-d | 5.7a-e | 6.7c-g | 6.0c-e | 5.7bc |
| ATF-006 | 5.3a-c | 7.0d-h | 7.0d-g | 5.3a-c | 6.3c-g | 6.7c-g | 5.7b-e | 7.0d-g |
| ATF-007 | 6.0b-e | 7.7f-i | 7.3e-g | 5.7a-d | 6.0b-f | 6.7c-g | 6.0c-e | 7.0d-g |
| Austin | 7.0e-h | 7.7f-i | 6.7c-f | 6.3b-f | 6.7d-h | 6.7c-g | 5.3b-d | 6.7c-f |
| Avanti | 6.0b-e | 6.0a-e | 6.7c-f | 6.3b-f | 7.0e-h | 6.3b-f | 5.0a-c | 7.0d-g |
| Aztec | 7.3f-h | 7.7f-i | 7.7fg | 6.0a-e | 5.7a-e | 7.0d-h | 6.0c-e | 8.0gh |
| BAR Fa 0855 | 6.7d-g | 7.7f-i | 7.0d-g | 6.0a-e | 7.0e-h | 7.0d-h | 4.7ab | 7.7f-h |
| BAR Fa 214 | 6.0b-e | 6.7c-g | 7.0d-g | 6.0a-e | 6.0b-f | 6.7c-g | 6.7e | 6.0b-d |
| BAR Fa 2AB | 5.3a-c | 7.3e-i | 6.7c-f | 5.7a-d | 6.0b-f | 6.7c-g | 5.0a-c | 7.7f-h |
| Bonanza | 6.7d-g | 6.7c-g | 6.3b-e | 6.0a-e | 6.7d-h | 6.7c-g | 5.0a-c | 6.7c-f |
| Bonanza II | 7.0e-h | 8.0g-i | 7.7fg | 6.0a-e | 6.3c-g | 7.7f-h | 5.3b-d | 7.7f-h |
| Bonsai | 5.7a-d | 7.0d-h | 7.7fg | 5.0ab | 7.7g-i | 5.7a-d | 6.0c-e | 6.3b-e |
| Bonsai Plus | 5.7a-d | 7.3e-i | 7.0d-g | 5.7a-d | 5.7a-e | 6.7c-g | 6.0c-e | 7.7f-h |
| Cafa 101 | 7.3f-h | 7.0d-h | 6.7c-f | 6.7c-f | 7.3f-i | 7.0d-h | 4.7ab | 7.0d-g |
| CAS-LA20 | 5.7a-d | 6.7c-g | 7.0d-g | 6.0a-e | 6.3c-g | 6.3b-f | 5.3b-d | 7.7f-h |
| CAS-MA21 | 6.0b-e | 8.0g-i | 6.3b-e | 6.7c-f | 7.3f-i | 8.0gh | 6.3de | 7.3e-h |
| Cochise | 6.0b-e | 7.3e-i | 7.0d-g | 5.7a-d | 7.3f-i | 5.7a-d | 6.3de | 6.3b-e |
| Cultivar 403 | 6.7d-g | 8.3hi | 7.0d-g | 6.3b-f | 6.0b-f | 7.3e-h | 6.0c-e | 7.7f-h |
| Duke | 6.7d-g | 7.7f-i | 7.0d-g | 7.0d-f | 7.7g-i | 7.0d-h | 5.3b-d | 7.0d-g |
| Eldorado | 6.7d-g | 8.0g-i | 7.3e-g | 5.7a-d | 7.3f-i | 7.0d-h | 6.0c-e | 7.3e-h |
| FA-19 | 5.7a-d | 7.0d-h | 7.0d-g | 5.3a-c | 5.7a-e | 6.0a-e | 6.3de | 6.7c-f |
| FA-22 | 6.3c-f | 7.3e-i | 6.7c-f | 6.0a-e | 6.7d-h | 6.0a-e | 6.0c-e | 6.0b-d |
| Falcon | 8.0h-j | 6.7c-g | 6.3b-e | 5.0ab | 6.3c-g | 6.3b-f | 5.3b-d | 6.3b-e |
| Finelawn 88 | 6.7d-g | 7.7f-i | 7.3e-g | 6.3b-f | 6.3c-g | 6.0a-e | 5.3b-d | 6.7c-f |
| Finelawn Petite | 5.7a-d | 7.3e-i | 7.0d-g | 5.7a-d | 6.7d-h | 5.7a-d | 5.3b-d | 6.7c-f |
| GEN-91 | 6.0b-e | 8.3hi | 7.3e-g | 7.0d-f | 6.7d-h | 6.7c-g | 5.0a-c | 7.7f-h |
| Guardian | 6.3c-f | 8.0g-i | 7.3e-g | 6.7c-f | 7.3f-i | 7.3e-h | 6.0c-e | 7.3e-h |
| ISI-AFA | 6.0b-e | 8.0g-i | 7.3e-g | 7.0d-f | 7.7g-i | 7.7f-h | 5.7b-e | 7.3e-h |
| ISI-AFE | 6.7d-g | 8.7i | 7.7fg | 7.3ef | 6.7d-h | 8.3h | 5.7b-e | 8.0gh |

*(continued)*

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

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

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

[4] Texture evaluations are made on a 1-9 scale where 1 = a very course turf blade and 9 = a very fine turf blade.

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

**Table 3.** The evaluation of tall fescue cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | Texture[4] | Color[5] |
|---|---|---|---|---|---|---|---|---|
| Cultivar | 4/18 | 4/29 | 6/10 | 7/26 | 8/23 | 10/10 | 10/10 | 10/11 |
| ISI-ATK | 7.3f-h | 7.7f-i | 7.0d-g | 7.0d-f | 7.3f-i | 8.0gh | 6.3de | 7.0d-g |
| ISI-CRC | 6.7d-g | 8.3hi | 6.7c-f | 7.3ef | 7.3f-i | 8.3h | 6.0c-e | 7.3e-h |
| ITR-90-2 | 5.7a-d | 7.3e-i | 7.3e-g | 6.0a-e | 7.7g-i | 7.0d-h | 6.0c-e | 7.7f-h |
| J-1048 | 6.3c-f | 8.0g-i | 7.3e-g | 6.7c-f | 6.3c-g | 7.0d-h | 5.3b-d | 7.7f-h |
| J1047 | 5.0ab | 6.7c-g | 6.7c-f | 6.3b-f | 7.3f-i | 6.0a-e | 5.3b-d | 7.0d-g |
| Kittyhawk | 6.3c-f | 7.0d-h | 7.0d-g | 5.7a-d | 6.0b-f | 6.0a-e | 5.7b-e | 7.0d-g |
| KWS-DSL | 6.0b-e | 7.0d-h | 7.3e-g | 5.7a-d | 6.7d-h | 6.7c-g | 5.7b-e | 7.3e-h |
| Ky-31 no endo | 8.7ij | 4.7a | 4.7a | 4.7a | 6.0b-f | 5.0ab | 4.7ab | 4.3a |
| Ky-31 w/endo | 9.0j | 5.0ab | 4.7a | 4.7a | 4.7ab | 4.7a | 4.0a | 4.3a |
| Lancer | 6.3c-f | 8.3hi | 7.7fg | 6.7c-f | 7.0e-h | 7.3e-h | 6.3de | 7.7f-h |
| Leprechaun | 6.0b-e | 8.0g-i | 8.0g | 6.7c-f | 6.7d-h | 6.7c-g | 5.3b-d | 7.3e-h |
| Lexus | 6.3c-f | 8.0g-i | 7.3e-g | 6.7c-f | 7.0e-h | 7.0d-h | 5.7b-e | 7.7f-h |
| M-2 | 6.3c-f | 7.7f-i | 6.7c-f | 5.7a-d | 6.3c-g | 6.7c-g | 6.3de | 6.7c-f |
| MB-21-92 | 5.7a-d | 6.7c-g | 6.7c-f | 7.0d-f | 7.0e-h | 7.0d-h | 5.7b-e | 7.7f-h |
| MB-22-92 | 6.0b-e | 7.7f-i | 6.7c-f | 6.3b-f | 7.0e-h | 7.3e-h | 5.3b-d | 7.7f-h |
| MB-23-92 | 5.7a-d | 7.7f-i | 6.7c-f | 6.3b-f | 7.0e-h | 7.0d-h | 6.0c-e | 7.3e-h |
| MB-24-92 | 5.3a-c | 7.3e-i | 7.3e-g | 6.7c-f | 7.0e-h | 7.3e-h | 5.7b-e | 7.7f-h |
| MB-25-92 | 5.7a-d | 7.0d-h | 7.3e-g | 6.3b-f | 7.3f-i | 7.3e-h | 6.0c-e | 7.7f-h |
| MED 10-1-1 | 5.7a-d | 7.0d-h | 7.0d-g | 5.3a-c | 6.3c-g | 7.0d-h | 5.3b-d | 7.0d-g |
| MED 10-6-8F | 5.3a-c | 6.3b-f | 7.0d-g | 5.7a-d | 6.0b-f | 6.7c-g | 5.3b-d | 7.0d-g |
| MED 10-7-2 | 5.7a-d | 7.3e-i | 6.7c-f | 6.3b-f | 7.0e-h | 7.7f-h | 5.0a-c | 7.0d-g |
| MED 2-3-10 | 6.3c-f | 7.0d-h | 6.7c-f | 5.0ab | 6.3c-g | 6.3b-f | 5.7b-e | 6.7c-f |
| MED 2-3-19 | 6.7d-g | 6.7c-g | 7.0d-g | 6.3b-f | 6.3c-g | 6.3b-f | 5.3b-d | 7.0d-g |
| MED 2-7-11 | 5.3a-c | 7.0d-h | 8.0g | 5.3a-c | 7.7g-i | 7.7f-h | 6.3de | 7.7f-h |
| MED 2-9-3 | 6.7d-g | 6.3b-f | 7.3e-g | 6.0a-e | 7.0e-h | 7.3e-h | 5.3b-d | 7.3e-h |
| Micro DD | 5.0ab | 7.0d-h | 7.7fg | 6.7c-f | 7.0e-h | 6.7c-g | 6.0c-e | 7.3e-h |
| Monarch | 6.7d-g | 7.0d-h | 6.7c-f | 6.3b-f | 6.0b-f | 6.3b-f | 5.7b-e | 7.0d-g |
| Montank | 6.7d-g | 7.7f-i | 7.7fg | 6.3b-f | 7.3f-i | 7.0d-h | 5.3b-d | 7.7f-h |
| OFI-TF-601 | 6.3c-f | 7.3e-i | 6.7c-f | 6.3b-f | 6.3c-g | 6.7c-g | 5.7b-e | 7.0d-g |
| Olympic II | 7.0e-h | 6.3b-f | 6.0b-d | 6.0a-e | 6.0b-f | 6.0a-e | 5.3b-d | 6.7c-f |
| Phoenix | 7.7g-i | 7.0d-h | 6.0b-d | 6.3b-f | 6.3c-g | 7.0d-h | 4.7ab | 6.7c-f |
| Pick 90-10 | 5.3a-c | 7.3e-i | 7.3e-g | 5.7a-d | 7.0e-h | 7.3e-h | 6.0c-e | 7.3e-h |
| Pick 90-12 | 5.3a-c | 8.7i | 7.3e-g | 6.3b-f | 8.7i | 7.3e-h | 5.3b-d | 7.3e-h |
| Pick 90-6 | 5.3a-c | 7.0d-h | 7.3e-g | 6.3b-f | 7.3f-i | 6.0a-e | 5.7b-e | 7.3e-h |

*(continued)*

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

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

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

[4] Texture evaluations are made on a 1-9 scale where 1 = a very course turf blade and 9 = a very fine turf blade.

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

**Table 3.** The evaluation of tall fescue cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | Texture[4] | Color[5] |
|---|---|---|---|---|---|---|---|---|
| Cultivar | 4/18 | 4/29 | 6/10 | 7/26 | 8/23 | 10/10 | 10/10 | 10/11 |
| Pick CII | 6.3c-f | 7.7f-i | 7.0d-g | 6.0a-e | 7.3f-i | 7.7f-h | 5.7b-e | 8.3h |
| Pixie | 5.7a-d | 8.0g-i | 7.7fg | 6.3b-f | 7.0e-h | 6.3b-f | 5.7b-e | 7.0d-g |
| PRO-9178 | 5.7a-d | 7.7f-i | 6.7c-f | 5.7a-d | 6.7d-h | 6.3b-f | 5.3b-d | 7.0d-g |
| PST-59D | 5.3a-c | 7.0d-h | 6.7c-f | 5.3a-c | 7.3f-i | 6.3b-f | 5.3b-d | 7.7f-h |
| PST-5DX w/endo | 6.0b-e | 7.7f-i | 7.3e-g | 7.0d-f | 7.0e-h | 7.7f-h | 6.7e | 8.0gh |
| PST-5LX | 5.0ab | 7.7f-i | 7.3e-g | 6.3b-f | 7.0e-h | 6.3b-f | 5.7b-e | 7.3e-h |
| PST-5PM | 6.3c-f | 8.3hi | 7.0d-g | 6.0a-e | 8.0hi | 7.7f-h | 6.0c-e | 8.0gh |
| PST-5STB | 5.3a-c | 6.7c-g | 7.0d-g | 4.7a | 5.0a-c | 5.7a-d | 5.0a-c | 7.0d-g |
| PST-5VC | 6.7d-g | 7.3e-i | 7.0d-g | 5.3a-c | 6.7d-h | 7.3e-h | 5.7b-e | 8.0gh |
| PST-RDG | 5.3a-c | 6.7c-g | 7.0d-g | 5.7a-d | 6.3c-g | 7.3e-h | 6.0c-e | 8.0gh |
| PSTF-200 | 7.0e-h | 7.7f-i | 8.0g | 7.0d-f | 7.7g-i | 7.3e-h | 6.0c-e | 7.0d-g |
| PSTF-401 | 6.0b-e | 7.0d-h | 6.7c-f | 6.7c-f | 7.7g-i | 7.7f-h | 6.3de | 7.3e-h |
| PSTF-LF | 7.0e-h | 7.7f-i | 7.3e-g | 6.0a-e | 7.0e-h | 7.0d-h | 6.0c-e | 7.7f-h |
| Rebel Jr | 6.7d-g | 8.3hi | 7.0d-g | 5.3a-c | 7.0e-h | 6.0a-e | 5.0a-c | 7.0d-g |
| Rebel-3D | 5.7a-d | 8.3hi | 7.7fg | 5.0ab | 6.7d-h | 5.7a-d | 5.3b-d | 7.0d-g |
| Safari | 6.3c-f | 6.7c-g | 5.7a-c | 5.7a-d | 6.0b-f | 6.3b-f | 5.3b-d | 6.7c-f |
| SFL | 6.0b-e | 7.0d-h | 7.7fg | 6.7c-f | 6.3c-g | 6.7c-g | 5.7b-e | 7.0d-g |
| Shenandoah | 6.7d-g | 7.0d-h | 6.7c-f | 6.3b-f | 7.0e-h | 7.0d-h | 5.3b-d | 7.0d-g |
| Silverado | 6.7d-g | 8.0g-i | 7.0d-g | 5.7a-d | 7.7g-i | 7.0d-h | 6.0c-e | 7.7f-h |
| SIU-1 | 6.3c-f | 6.7c-g | 7.0d-g | 7.0d-f | 6.0b-f | 7.7f-h | 5.7b-e | 7.3e-h |
| SR 8010 | 6.7d-g | 6.7c-g | 6.7c-f | 6.0a-e | 6.7d-h | 6.0a-e | 6.3de | 5.7bc |
| SR 8200 | 5.3a-c | 8.0g-i | 7.3e-g | 6.3b-f | 7.7g-i | 7.3e-h | 6.0c-e | 7.0d-g |
| SR 8210 | 6.3c-f | 7.7f-i | 7.7fg | 6.3b-f | 7.7g-i | 6.3b-f | 5.7b-e | 7.0d-g |
| SR 8300 | 6.7d-g | 7.0d-h | 6.3b-e | 5.7a-d | 6.7d-h | 7.3e-h | 6.0c-e | 6.7c-f |
| SR 8400 | 6.3c-f | 8.3hi | 7.7fg | 7.7f | 7.3f-i | 8.0gh | 6.3de | 7.0d-g |
| Tomahawk | 6.0b-e | 8.0g-i | 7.0d-g | 7.3ef | 7.7g-i | 7.3e-h | 5.7b-e | 8.0gh |
| Trailblazer II | 6.0b-e | 7.7f-i | 7.3e-g | 6.3b-f | 6.7d-h | 7.3e-h | 5.7b-e | 8.0gh |
| Twilight | 4.7a | 5.7a-d | 7.0d-g | 5.0ab | 5.3a-d | 5.7a-d | 5.0a-c | 7.7f-h |
| Vegas | 6.0b-e | 7.7f-i | 7.0d-g | 6.3b-f | 7.3f-i | 6.3b-f | 5.0a-c | 7.7f-h |
| Virtue | 6.0b-e | 7.7f-i | 7.3e-g | 6.0a-e | 7.3f-i | 7.0d-h | 5.3b-d | 7.7f-h |
| WSI-208-2 | 5.3a-c | 6.3b-f | 6.7c-f | 7.0d-f | 7.7g-i | 7.7f-h | 6.0c-e | 7.7f-h |
| ZPS-E2 | 6.0b-e | 7.7f-i | 7.7fg | 6.7c-f | 7.7g-i | 7.3e-h | 6.3de | 7.0d-g |
| ZPS-J3 | 6.7d-g | 8.3hi | 7.3e-g | 7.3ef | 7.7g-i | 7.7f-h | 6.3de | 7.0d-g |
| ZPS-ML | 5.0ab | 7.7f-i | 8.0g | 6.3b-f | 7.7g-i | 7.7f-h | 6.0c-e | 8.3h |
| ZPS-VL | 5.0ab | 6.0a-e | 7.0d-g | 5.0ab | 6.0b-f | 5.3a-c | 5.7b-e | 7.7f-h |

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

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

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

[4] Texture evaluations are made on a 1-9 scale where 1 = a very course turf blade and 9 = a very fine turf blade.

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

# NTEP Fine Fescue Cultivar Trial

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

| | |
|---|---|
| **Research Protocol:** | **NTEP Fine Fescue Cultivar Evaluation** |
| **Location:** | Ornamental Horticulture Research Cntr, Urbana, IL |
| **Site Preparation:** | existing vegetation killed with Roundup; area rototilled and graded; fertilized - 1 lb N/M. |
| **Seeding/ Establishment:** | seeding date - September 21, 1993; seeding rate - 4.4 lbs seed/M; plot size - 5 ft x 5 ft; straw mulch at 1.5 bales/M; irrigation - to insure germination. |
| **Plot Maintenance:** | mowing height - 2.5 inches; irrigation - only during severe moisture stress and dormancy; |
| **1994** | pesticides - none; fertilization - 1 lb N/M in Nov. |
| **Experimental Design:** | RCB; 3 replications. |

Fine fescue is a common name used to describe several turfgrass species and subspecies in the genus *Festuca*. These species all have a fine leaf blade and are adapted to a wide range of climates and management practices. They are used in seed mixtures for use in home lawns, on roadsides, and golf course roughs. Some fine fescues are used to overseed greens in subtropical climates for winter color and play. Fine fescues used as turfgrass include creeping red fescue, a strong creeping type and a slender creeping type (*Festuca rubra* L ssp. *rubra* and *Festuca rubra* L. ssp. *trichophylla* Gaud. or ssp. *litoralis*). Chewings fescue (*F. rubra* L. subsp. *commutata* Gaud.), sheep fescue (*F. ovina*) and hard fescue (*F. longifolia*) have bunch type growth habit. Creeping and chewings fescue are best adapted to well drained, moderately shaded sites with low to moderate management. They tolerate mowing heights of 1.5-3.0 inches and grow best with fertilization at 2 lbs N/M/yr or less. Sheep fescue is best adapted to sites of very low management. It is often used for soil stabilization on well-drained sandy or gravelly soils. It does not mix well with other types of turfgrass due to its bunch type growth habit and its stiff bluish-green leaves. Like the other fine fescues, hard fescue does well in dry soils of low fertility, however, it is more tolerant to moist, fertile soils and close mowing than sheep fescue. Because of the low management needs of fine fescues, effort has been made to develop new cultivars with better heat tolerance and disease resistance. NTEP has designed a fine fescue trial that will examine 60 fine fescue cultivars at 32 sites across the United States (26 chewings, 15 hard, 2 sheep 17 creeping). The evaluation was established at the University of Illinois in September 1993.

Turfgrass quality and spring greenup is presented in Table 4. Leaf blade color and texture are presented in Table 5. Most fine fescue cultivars exhibited fair spring greenup and early quality. Quality improved throughout the summer with 24 cultivars rated 7.0 or above in July (scale 1-9, 9 = highest turf quality and 1 = 100% necrotic turf). Cultivars with a rating of 7.7 or higher at this time were 'MB 66-93,' 'PST-4DT,' 'Pamela,' 'PST-4ST,' and 'Medina.' General quality declined slightly in the fall with only 8 cultivars evaluated at 7.0 or greater in October. Most fine fescue cultivars maintained good to excellent color. No significant difference in blade texture was observed among culitvars. All were evaluated as having a very fine texture.

**Table 4.** The evaluation of fine fescue cultivars during the 1994 growing season.[1]

| | Spring Greenup[2] | Quality[3] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cultivar | 3-31 | 4-28 | 5-26 | 7-17 | 8-9 | 9-1 | 10-3 | 10-26 |
| Aruba | 6.0de | 6.3f-i | 6.7c-g | 5.7b-f | 6.0b-f | 6.0b-f | 5.0bc | 5.3b-d |
| Aurora endo | 5.3b-d | 4.7a-d | 6.0a-e | 7.3e-h | 6.3b-f | 5.7b-e | 5.7c-e | 6.3d-g |
| Banner II | 6.0de | 7.0hi | 7.3e-h | 6.3c-g | 6.3b-f | 6.0b-f | 7.0f-h | 6.0c-f |
| BAR Frr 4ZBD | 4.3a | 5.3c-f | 6.7c-g | 6.3c-g | 5.0bc | 5.3b-d | 5.7c-e | 6.0c-f |
| BAR UR 204 | 5.7c-e | 6.3f-i | 7.0d-g | 5.0a-d | 5.3b-d | 5.3b-d | 5.3b-d | 5.7b-e |
| Bridgeport | 6.0de | 6.3f-i | 7.3e-h | 6.7c-h | 7.0d-f | 6.3c-g | 6.7e-h | 6.0c-f |
| Brigade | 6.0de | 4.3a-c | 5.7a-d | 7.3e-h | 6.7c-f | 6.0b-f | 6.0c-f | 5.3b-d |
| Brittany | 5.3b-d | 5.0b-e | 6.3b-f | 6.0b-g | 6.0b-f | 5.7b-e | 6.3d-g | 6.3d-g |
| CAS-FR13 | 5.7c-e | 5.3c-f | 6.3b-f | 6.3c-g | 6.7c-f | 6.3c-g | 5.7c-e | 5.7b-e |
| Cascade | 5.7c-e | 7.3i | 6.3b-f | 5.0a-d | 6.0b-f | 5.3b-d | 5.3b-d | 5.7b-e |
| Common creeping | 5.7c-e | 7.0hi | 7.3e-h | 6.0b-g | 6.0b-f | 6.0b-f | 6.0c-f | 6.0c-f |
| Cultivar 67135 | 7.7f | 5.3c-f | 4.7a | 3.0a | 2.7a | 3.0a | 3.7a | 3.3a |
| Darwin | 5.0a-c | 4.3a-c | 5.7a-d | 7.3e-h | 6.3b-f | 6.0b-f | 6.0c-f | 6.3d-g |
| Dawson | 4.7ab | 5.7d-g | 6.7c-g | 7.0d-h | 6.0b-f | 7.0e-g | 7.0f-h | 7.7h |
| Discovery | 5.3b-d | 4.0ab | 5.0ab | 6.3c-g | 6.7c-f | 6.0b-f | 6.0c-f | 6.3d-g |
| Ecostar | 5.0a-c | 5.3c-f | 7.0d-g | 5.0a-d | 5.3b-d | 6.0b-f | 6.0c-f | 6.7e-h |
| Flyer | 5.3b-d | 6.3f-i | 5.7a-d | 6.0b-g | 5.0bc | 5.3b-d | 5.7c-e | 6.3d-g |
| FO 143 | 4.3a | 4.0ab | 5.3a-c | 7.0d-h | 6.0b-f | 5.0bc | 4.3ab | 4.7b |
| ISI-FC-62 | 6.0de | 6.3f-i | 7.7f-h | 6.7c-h | 7.3ef | 6.3c-g | 7.0f-h | 6.7e-h |
| Jamestown | 5.0a-c | 7.0hi | 7.7f-h | 5.7b-f | 6.0b-f | 5.3b-d | 5.7c-e | 5.0bc |
| Jamestown II | 6.0de | 7.0hi | 8.7h | 6.3c-g | 7.3ef | 6.7d-g | 6.7e-h | 6.3d-g |
| Jasper | 5.0a-c | 6.0e-h | 5.7a-d | 4.0ab | 4.7b | 4.7b | 6.3d-g | 7.0f-h |
| MB 61-93 | 5.3b-d | 5.7d-g | 6.3b-f | 7.3e-h | 6.3b-f | 6.7d-g | 6.3d-g | 6.3d-g |
| MB 63-93 | 6.0de | 4.3a-c | 6.3b-f | 7.0d-h | 6.3b-f | 6.3c-g | 6.0c-f | 6.3d-g |
| MB 64-93 | 5.3b-d | 5.7d-g | 6.7c-g | 7.0d-h | 7.0d-f | 6.3c-g | 6.3d-g | 6.3d-g |
| MB 65-93 | 6.3e | 6.0e-h | 8.0gh | 7.3e-h | 7.7f | 7.3fg | 6.3d-g | 6.3d-g |
| MB 66-93 | 6.0de | 5.0b-e | 7.3e-h | 7.7f-h | 6.7c-f | 5.7b-e | 6.3d-g | 5.3b-d |
| MB 81-93 | 6.0de | 4.3a-c | 5.3a-c | 6.7c-h | 5.3b-d | 5.7b-e | 5.7c-e | 6.0c-f |
| MB 82-93 | 5.7c-e | 5.0b-e | 7.0d-g | 6.7c-h | 6.0b-f | 6.7d-g | 6.0c-f | 6.7e-h |
| MB 83-93 | 5.3b-d | 5.0b-e | 7.0d-g | 6.7c-h | 6.0b-f | 6.0b-f | 6.0c-f | 6.7e-h |

*(continued)*

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

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

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

**Table 4**. The evaluation of fine fescue cultivars during the 1994 growing season.[1] *(continued)*

| | Spring Greenup[2] | Quality[3] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cultivar | 3-31 | 4-28 | 5-26 | 7-17 | 8-9 | 9-1 | 10-3 | 10-26 |
| MED 32 | 4.7ab | 4.7a-d | 6.0a-e | 7.0d-h | 5.3b-d | 5.3b-d | 5.0bc | 5.7b-e |
| Medina | 6.3e | 5.3c-f | 7.3e-h | 8.7h | 6.7c-f | 6.0b-f | 6.7e-h | 5.7b-e |
| Molinda | 6.0de | 5.7d-g | 7.0d-g | 5.3b-e | 5.3b-d | 5.7b-e | 6.0c-f | 6.0c-f |
| NJ F-93 | 5.3b-d | 6.0e-h | 7.7f-h | 5.3b-e | 6.3b-f | 6.7d-g | 6.3d-g | 6.0c-f |
| Nordic | 5.3b-d | 4.7a-d | 7.0d-g | 7.0d-h | 6.7c-f | 6.0b-f | 6.0c-f | 6.3d-g |
| Pamela | 6.0de | 5.0b-e | 7.3e-h | 8.0gh | 6.0b-f | 6.0b-f | 5.3b-d | 5.7b-e |
| Pick 4-91W | 5.7c-e | 5.3c-f | 7.3e-h | 5.0a-d | 6.0b-f | 6.7d-g | 6.7e-h | 6.3d-g |
| PRO 92/20 | 5.7c-e | 7.3i | 7.7f-h | 5.7b-f | 6.7c-f | 6.3c-g | 6.3d-g | 6.7e-h |
| PRO 92/24 | 5.3b-d | 5.3c-f | 6.7c-g | 7.3e-h | 6.3b-f | 6.7d-g | 5.7c-e | 6.7e-h |
| PST 44D | 5.3b-d | 5.3c-f | 5.7a-d | 6.0b-g | 6.3b-f | 6.0b-f | 5.3b-d | 6.3d-g |
| PST-4DT | 6.0de | 5.7d-g | 7.0d-g | 8.0gh | 7.0d-f | 7.7g | 7.0f-h | 7.7h |
| PST-4ST | 6.0de | 5.3c-f | 6.3b-f | 8.0gh | 7.0d-f | 7.3fg | 7.0f-h | 7.0f-h |
| PST-4VB Endo | 5.0a-c | 4.7a-d | 6.0a-e | 7.0d-h | 6.0b-f | 6.7d-g | 7.7h | 7.3gh |
| Reliant II | 6.0de | 3.7a | 5.3a-c | 7.0d-h | 6.3b-f | 6.3c-g | 6.0c-f | 6.3d-g |
| Rondo | 5.3b-d | 5.7d-g | 7.0d-g | 7.3e-h | 6.0b-f | 6.0b-f | 5.7c-e | 5.7b-e |
| Scaldis | 6.0de | 4.3a-c | 5.7a-d | 6.3c-g | 5.7b-e | 5.0bc | 5.3b-d | 6.3d-g |
| Seabreeze | 5.0a-c | 6.3f-i | 7.0d-g | 7.0d-h | 6.0b-f | 6.0b-f | 6.3d-g | 7.7h |
| Shademaster II | 5.0a-c | 4.3a-c | 6.0a-e | 6.3c-g | 6.7c-f | 6.7d-g | 5.7c-e | 6.3d-g |
| Shadow E | 5.7c-e | 5.7d-g | 6.7c-g | 5.7b-f | 6.3b-f | 6.7d-g | 6.7e-h | 6.0c-f |
| Spartan | 5.7c-e | 5.0b-e | 5.7a-d | 6.3c-g | 5.3b-d | 6.0b-f | 6.0c-f | 6.0c-f |
| SR 3100 | 5.3b-d | 4.0ab | 5.3a-c | 7.3e-h | 6.0b-f | 5.7b-e | 5.7c-e | 6.0c-f |
| SR 5100 | 5.3b-d | 6.3f-i | 6.3b-f | 5.3b-e | 6.3b-f | 5.7b-e | 6.7e-h | 6.7e-h |
| Tiffany | 5.7c-e | 5.7d-g | 7.0d-g | 7.0d-h | 6.3b-f | 6.3c-g | 7.3gh | 7.0f-h |
| TMI-3CE | 5.7c-e | 6.0e-h | 7.7f-h | 5.7b-f | 7.7f | 7.0e-g | 6.3d-g | 6.7e-h |
| Victory | 6.0de | 6.7g-i | 7.7f-h | 6.3c-g | 6.3b-f | 6.7d-g | 6.7e-h | 6.7e-h |
| WVPB-STCR-101 | 6.0de | 6.0e-h | 6.7c-g | 6.7c-h | 6.0b-f | 6.0b-f | 5.0bc | 4.7b |
| WX3-FF54 | 5.3b-d | 5.0b-e | 7.3e-h | 7.0d-h | 6.7c-f | 6.7d-g | 6.7e-h | 6.0c-f |
| WX3-FFG6 | 5.7c-e | 5.7d-g | 7.0d-g | 4.7a-c | 4.7b | 5.3b-d | 6.0c-f | 6.3d-g |
| ZPS-4BN | 5.3b-d | 6.3f-i | 6.7c-g | 5.3b-e | 6.0b-f | 6.3c-g | 7.3gh | 7.0f-h |
| ZPS-MG | 6.0de | 6.7g-i | 8.0gh | 6.3c-g | 6.3b-f | 6.7d-g | 6.3d-g | 6.3d-g |

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

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

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

**Table 5.** The evaluation of the color and texture of 60 fine fescue cultivars during the 1994 growing season. [1]

| Cultivar | Color[2] 9-19 | Texture[3ns] 10-05 | Cultivar | Color[2] 9-19 | Texture[3ns] 10-05 |
|---|---|---|---|---|---|
| Aruba | 5.7a-c | 9.0 | MED 32 | 7.0d-g | 9.0 |
| Aurora endo | 7.0d-g | 9.0 | Medina | 8.0gh | 9.0 |
| Banner II | 6.3b-e | 9.0 | Molinda | 6.7c-f | 9.0 |
| BAR Frr 4ZBD | 8.0gh | 8.7 | NJ F-93 | 7.0d-g | 9.0 |
| BAR UR 204 | 5.3ab | 8.7 | Nordic | 7.3e-h | 9.0 |
| Bridgeport | 7.3e-h | 9.0 | Pamela | 6.7c-f | 9.0 |
| Brigade | 7.7f-h | 9.0 | Pick 4-91W | 7.0d-g | 8.7 |
| Brittany | 8.0gh | 9.0 | PRO 92/20 | 6.7c-f | 9.0 |
| CAS-FR13 | 7.7f-h | 8.7 | PRO 92/24 | 5.7a-c | 9.0 |
| Cascade | 5.3ab | 9.0 | PST 44D | 7.0d-g | 9.0 |
| Common creeping | 5.0a | 9.0 | PST-4DT | 7.3e-h | 9.0 |
| Cultivar 67135 | 5.7a-c | 9.0 | PST-4ST | 7.3e-h | 9.0 |
| Darwin | 8.0gh | 9.0 | PST-4VB Endo | 8.3h | 8.7 |
| Dawson | 6.3b-e | 9.0 | Reliant II | 7.0d-g | 9.0 |
| Discovery | 8.3h | 9.0 | Rondo | 6.0a-d | 9.0 |
| Ecostar | 7.0d-g | 8.7 | Scaldis | 7.7f-h | 8.7 |
| Flyer | 6.7c-f | 9.0 | Seabreeze | 7.3e-h | 9.0 |
| FO 143 | 7.3e-h | 9.0 | Shademaster II | 7.7f-h | 9.0 |
| ISI-FC-62 | 7.0d-g | 9.0 | Shadow E | 7.3e-h | 9.0 |
| Jamestown | 6.3b-e | 9.0 | Spartan | 6.7c-f | 9.0 |
| Jamestown II | 6.0a-d | 9.0 | SR 3100 | 7.0d-g | 9.0 |
| Jasper | 8.0gh | 9.0 | SR 5100 | 6.7c-f | 8.7 |
| MB 61-93 | 7.0d-g | 9.0 | Tiffany | 7.3e-h | 9.0 |
| MB 63-93 | 7.7f-h | 9.0 | TMI-3CE | 7.0d-g | 9.0 |
| MB 64-93 | 7.7f-h | 9.0 | Victory | 6.0a-d | 9.0 |
| MB 65-93 | 7.7f-h | 9.0 | WVPB-STCR-101 | 7.3e-h | 9.0 |
| MB 66-93 | 7.0d-g | 9.0 | WX3-FF54 | 7.3e-h | 9.0 |
| MB 81-93 | 7.0d-g | 9.0 | WX3-FFG6 | 7.3e-h | 9.0 |
| MB 82-93 | 7.3e-h | 9.0 | ZPS-4BN | 7.7f-h | 9.0 |
| MB 83-93 | 8.3h | 9.0 | ZPS-MG | 7.0d-g | 9.0 |

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

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

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

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

# 1993 NTEP Bentgrass Evaluation

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

| | |
|---|---|
| **Research Protocol:** | **1993 NTEP Bentgrass Cultivar Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | existing vegetation killed with Roundup; area surfaced tilled; fertilized at 1 lb N/M, an additional 1 lb N/M was applied after germination. |
| **Seeding/ Establishment:** | seeding date - September 10, 1993; seeding rate - 0.5 lb seed/M; plot size - 5 ft x 5 ft; irrigation - to insure germination. |
| **Plot Maintenance:** | mowing height - greens, 0.25 inches, fairway, 0.5 inches. |
| **1994** | irrigation - to prevent stress pesticides - none; fungicides - throughout the season to control and prevent disease; fertilization - 4.0 lbs N/M/yr. |
| **Experimental Design:** | RCB; 3 replications. |

Over the last few years, two factors have resulted in an increased interest in creeping bentgrass (*Agrostis palustris*). These factors are the use of creeping bentgrass for golf course fairways and increased construction of golf courses. Commercial and public breeders responded to the increased interest in creeping bentgrass by developing new cultivars. The purpose of this study is to evaluate new cultivars of bentgrass for use as fairway and putting green turf. Two sets of plots were established in the fall of 1993, one set of 28 cultivars is being mowed at putting green height (0.25 inch) while the other set, 21 cultivars, is being mowed at fairway height (0.5 inch). Turf maintained at both mowing heights is being fertilized with 4 lbs of nitrogen annually. These field trials are part of the NTEP study.

***Results of Putting Green Height of Cut*** - Early spring greenup was fair to good for bentgrass mowed at putting green height (Table 6). Turf quality was poor to fair for most of the growing season, with some improvement in the fall. This is most likely do to high *Poa annua* infestation (Table 7). Cultivars with greater than 30% *P. annua* infestation include 'BAR AS 493,' 'Tendez,' 'G-2,' 'BAR Ws 42102,' and 'DG-P.' High *P. annua* infestation could be the result of poor establishment rate and low nitrogen fertilization. Cultivars that consistantly exhibited better quality than other cultivars in the study were 'Crenshaw,' 'A-4,' 'Providence,' and 'Pennlinks.' Turf color (genetic) during September was fair to excellent (Table 7). All cultivars exhibited a fine leaf texture (Table 7).

**Table 6.** The evaluation of bentgrass cultivars mowed at the putting green height of cut during the 1994 growing season. [1]

| Cultivar | Spring Greenup[2] 3-31 | Quality[3] 4-28 | 5-26 | 7-6 | 8-2 | 9-1 | 9-28 | 10-28 |
|---|---|---|---|---|---|---|---|---|
| A-1 | 6.3a-c | 4.0c-e | 4.0b-d | 4.3ef | 5.3c-e | 6.3ef | 6.7gh | 6.7gh |
| A-4 | 7.0c | 4.7ef | 4.3c-e | 4.3ef | 5.7de | 6.3ef | 6.7gh | 6.3f-h |
| BAR AS 493 | 6.3a-c | 2.7a | 2.7a | 2.3a | 3.0a | 3.0a | 4.3a-c | 3.7a |
| BAR Ws 42102 | 6.0ab | 3.0ab | 3.7bc | 3.7c-e | 5.3c-e | 5.7c-f | 5.3c-f | 5.7d-g |
| Cato | 6.7bc | 3.7b-d | 4.3c-e | 3.7c-e | 5.0c-e | 6.3ef | 6.0e-h | 6.7gh |
| Crenshaw | 6.0ab | 5.0f | 4.7de | 4.3ef | 5.3c-e | 6.3ef | 6.3f-h | 6.7gh |
| Cultivar 18th Green | 5.7a | 3.3a-c | 3.3ab | 3.0a-c | 4.3bc | 5.3c-e | 5.3c-f | 4.3a-c |
| DG-P | 6.3a-c | 3.0ab | 3.3ab | 2.7ab | 4.3bc | 5.3c-e | 5.7d-g | 5.0b-e |
| G-2 | 6.7bc | 3.0ab | 3.7bc | 4.0d-f | 5.0c-e | 5.3c-e | 6.3f-h | 6.7gh |
| G-6 | 6.7bc | 3.3a-c | 4.0b-d | 3.7c-e | 5.0c-e | 5.7c-f | 6.0e-h | 6.0e-h |
| ISI-Ap-89150 | 7.0c | 4.0c-e | 4.0b-d | 3.3b-d | 5.0c-e | 5.3c-e | 6.0e-h | 5.7d-g |
| L-93 | 7.0c | 4.0c-e | 4.7de | 4.0d-f | 5.7de | 5.7c-f | 6.7gh | 6.3f-h |
| Lopez | 7.0c | 3.7b-d | 3.3ab | 3.3b-d | 4.7b-d | 5.0b-d | 5.3c-f | 4.7a-d |
| MSUEB | 7.0c | 4.3d-f | 4.7de | 3.3b-d | 4.7b-d | 5.0b-d | 5.7d-g | 5.0b-e |
| Penncross | 7.0c | 5.0f | 5.0e | 4.0d-f | 5.0c-e | 5.0b-d | 5.0b-e | 4.0ab |
| Pennlinks | 7.0c | 4.3d-f | 4.7de | 4.3ef | 5.7de | 5.3c-e | 5.3c-f | 5.0b-e |
| PRO/CUP | 6.7bc | 4.3d-f | 3.7bc | 3.3b-d | 4.7b-d | 5.0b-d | 5.3c-f | 5.0b-e |
| Providence | 7.0c | 5.0f | 5.0e | 4.3ef | 6.0e | 6.7f | 7.0h | 7.0h |
| Regent | 7.0c | 4.7ef | 4.0b-d | 3.3b-d | 5.0c-e | 5.3c-e | 5.3c-f | 5.0b-e |
| Seaside | 7.0c | 4.7ef | 3.7bc | 3.0a-c | 3.7ab | 4.0ab | 4.0ab | 4.0ab |
| Southshore | 7.0c | 4.3d-f | 4.3c-e | 3.7c-e | 4.3bc | 5.7c-f | 6.0e-h | 5.7d-g |
| SR 1020 | 6.3a-c | 4.0c-e | 4.0b-d | 4.0d-f | 4.3bc | 5.3c-e | 6.3f-h | 5.7d-g |
| Syn 92-1-93 | 6.3a-c | 4.0c-e | 4.0b-d | 4.7f | 5.7de | 5.7c-f | 6.3f-h | 5.3c-f |
| Syn 92-2-93 | 6.3a-c | 4.0c-e | 4.3c-e | 4.3ef | 4.3bc | 4.0ab | 5.7d-g | 5.0b-e |
| Syn 92-5-93 | 6.7bc | 4.7ef | 4.3c-e | 4.0d-f | 5.0c-e | 6.0d-f | 6.3f-h | 5.7d-g |
| Syn-1-88 | 6.7bc | 4.3d-f | 4.3c-e | 3.7c-e | 5.7de | 5.0b-d | 5.0b-e | 5.3c-f |
| Tendez | 6.3a-c | 3.0ab | 3.7bc | 2.7ab | 3.0a | 3.3a | 3.7a | 4.0ab |
| Trueline | 6.7bc | 4.0c-e | 4.0b-d | 3.3b-d | 4.7b-d | 4.7bc | 4.7a-d | 5.0b-e |

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

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

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

**Table 7.** The evaluation of creeping bentgrass cultivars mowed at the putting green height of cut during the 1994 growing season. [1]

| Cultivar | % Poa annua[2] 5-26 | Color[3] 9-19 | Texture[4] 10-05 |
|---|---|---|---|
| A-1 | 23.3c-g | 8.0ef | 8.7cd |
| A-4 | 16.7a-d | 7.7d-f | 9.0d |
| BAR AS 493 | 50.0j | 6.3a-c | 8.7cd |
| BAR Ws 42102 | 31.7g-i | 7.7d-f | 8.7cd |
| Cato | 20.0a-f | 8.0ef | 9.0d |
| Crenshaw | 16.7a-d | 8.3f | 8.3b-d |
| Cultivar 18th Green | 28.3f-i | 7.3c-f | 8.0a-c |
| DG-P | 31.7g-i | 8.0ef | 8.0a-c |
| G-2 | 35.0hi | 7.7d-f | 8.7cd |
| G-6 | 26.7e-h | 7.7d-f | 8.7cd |
| ISI-Ap-89150 | 16.7a-d | 8.0ef | 8.0a-c |
| L-93 | 18.3a-e | 8.0ef | 8.3b-d |
| Lopez | 25.0d-g | 6.7a-d | 8.0a-c |
| MSUEB | 15.0a-c | 6.7a-d | 8.0a-c |
| Penncross | 11.7a | 6.3a-c | 7.7ab |
| Pennlinks | 15.0a-c | 6.7a-d | 8.0a-c |
| PRO/CUP | 21.7b-f | 7.0b-e | 8.0a-c |
| Providence | 16.7a-d | 8.0ef | 8.3b-d |
| Regent | 13.3ab | 7.7d-f | 8.0a-c |
| Seaside | 11.7a | 6.7a-d | 7.3a |
| Southshore | 13.3ab | 7.0b-e | 8.7cd |
| SR 1020 | 18.3a-e | 7.3c-f | 8.3a-c |
| Syn 92-1-93 | 18.3a-e | 7.0b-e | 9.0d |
| Syn 92-2-93 | 18.3a-e | 6.0ab | 8.7cd |
| Syn 92-5-93 | 20.0a-f | 7.3c-f | 8.7cd |
| Syn-1-88 | 11.7a | 6.7a-d | 8.0a-c |
| Tendez | 36.7i | 5.7a | 8.7cd |
| Trueline | 16.7a-d | 6.3a-c | 8.0a-c |

***Results of Fairway Height of Cut*** - No significant difference in spring greenup was observed among cultivars mowed at 0.5 inch (Table 8). Greenup ratings ranged from fair to good. Bentgrass quality throughout the season was fair and showed some improvement in the fall. As noted in the previous discussion, this lackluster performance is most likely do to high *Poa annua* infestation. Cultivars that consistantly exhibited better quality than other cultivars in the study were 'Crenshaw,' 'Penneagle,' 'Providence,' and 'Penncross.' Cultivars with greater than 30% *P. annua* infestation include 'BAR AS 493,' 'Tendez,' 'G-2,' 'BAR Ws 42102,' 'Lopez,' 'SR 7100,' and 'G-6' (Table 9). Bentgrass color (genetic) was fair to excellent and leaf blade texture excellent (Table 9).

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

[2] Percent Poa annua evaluations are a visual estimate of percent of the plot covered with annual bluegrass.

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

[4] Texture evaluations are made on 1-9 scale where 1 = a very course turf blade and 9 = very fine turf blade.

**Table 8.** The evaluation of bentgrass cultivars mowed at a fairway height of cut during the 1994 growing season. [1]

| | Spring Greenup[2ns] | Quality[3] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cultivar | 3-31 | 4-28 | 5-26 | 7-6ns | 8-2ns | 9-1 | 9-28 | 10-28 |
| BAR AS 493 | 5.7 | 2.3a | 2.7a | 3.3 | 4.7 | 4.3ab | 4.3ab | 4.3b-d |
| BAR Ws 42102 | 5.7 | 2.7ab | 4.3bc | 4.3 | 5.7 | 5.7c-f | 6.3e-g | 6.0f-h |
| Cato | 5.7 | 3.7b-e | 4.3bc | 4.0 | 5.0 | 6.0d-f | 7.7h | 7.0h |
| Cltvr 18th Green | 5.7 | 2.7ab | 4.0b | 3.7 | 5.0 | 5.3b-e | 5.3b-e | 5.0d-f |
| Crenshaw | 6.7 | 4.0c-f | 5.3cd | 4.7 | 6.0 | 6.3eg | 7.0gh | 7.0h |
| DF-1 | 6.0 | 4.0c-f | 4.7b-d | 4.7 | 5.3 | 6.3eg | 6.7f-h | 6.0f-h |
| Exeter | 6.7 | 3.7b-e | 4.7b-d | 3.3 | 5.0 | 4.0a | 4.3ab | 4.3b-d |
| G-2 | 6.3 | 2.3a | 4.0b | 4.0 | 4.7 | 5.0a-d | 6.0d-g | 6.0f-h |
| G-6 | 6.0 | 3.3a-d | 4.3bc | 4.3 | 5.3 | 6.3eg | 6.7f-h | 6.7gh |
| ISI-At-90162 | 6.3 | 3.7b-e | 5.0b-d | 5.0 | 5.7 | 5.3b-e | 5.7c-f | 5.7e-g |
| Lopez | 6.3 | 2.7ab | 4.3bc | 4.0 | 5.3 | 4.7a-c | 5.0b-d | 5.0d-f |
| OM-At-90163 | 6.3 | 4.0c-f | 5.3cd | 4.7 | 5.7 | 4.7a-c | 4.7bc | 4.7c-e |
| Penncross | 6.3 | 4.3d-f | 5.7d | 5.0 | 6.0 | 5.0a-d | 5.0b-d | 4.3b-d |
| Penneagle | 7.3 | 4.3d-f | 5.0b-d | 5.3 | 6.0 | 6.7f | 7.0gh | 6.0f-h |
| PRO/CUP | 6.3 | 3.3a-d | 4.3bc | 4.7 | 5.7 | 5.7c-f | 5.0b-d | 5.7e-g |
| Providence | 6.3 | 4.7ef | 5.7d | 4.7 | 6.0 | 6.0d-f | 7.0gh | 7.0h |
| Seaside | 7.0 | 5.0f | 5.3cd | 4.7 | 4.7 | 4.0a | 3.3a | 3.0a |
| Southshore | 6.0 | 4.3d-f | 5.3cd | 4.3 | 6.0 | 6.0d-f | 6.7f-h | 7.0h |
| SR 7100 | 7.7 | 2.7ab | 4.3bc | 3.7 | 5.7 | 4.3ab | 4.3ab | 3.7a-c |
| Tendez | 6.3 | 3.0a-c | 4.0b | 3.7 | 5.3 | 4.3ab | 4.7bc | 3.3ab |
| Trueline | 6.3 | 3.7b-e | 4.3bc | 5.0 | 5.7 | 5.7c-f | 5.7c-f | 5.0d-f |

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

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

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

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

**Table 9.** The evaluation of bentgrass cultivars mowed at a fairway height of cut during the 1994 growing season. [1]

| Cultivar | % Poa Annua[2] 5-26 | Color[3] 9-19 | Texture[4] 10-05 |
|---|---|---|---|
| BAR AS 493 | 65.0f | 6.3a-d | 7.7bc |
| BAR Ws 42102 | 30.0c-e | 7.3de | 8.0cd |
| Cato | 20.0a-d | 7.7e | 8.3de |
| Cltvr 18th Green | 28.3b-e | 7.3de | 7.7bc |
| Crenshaw | 13.3a-c | 7.3de | 7.3ab |
| DF-1 | 20.0a-d | 7.0c-e | 8.0cd |
| Exeter | 20.0a-d | 7.0c-e | 7.3ab |
| G-2 | 45.0e | 7.0c-e | 8.0cd |
| G-6 | 30.0c-e | 7.3de | 8.3de |
| ISI-At-90162 | 28.3b-e | 5.3a | 8.0cd |
| Lopez | 35.0de | 6.7b-e | 7.0a |
| OM-At-90163 | 20.0a-d | 6.0a-c | 8.0cd |
| Penncross | 10.0a | 7.0c-e | 7.0a |
| Penneagle | 16.7a-c | 7.3de | 7.7bc |
| PRO/CUP | 26.7a-d | 6.7b-e | 7.3ab |
| Providence | 15.0a-c | 7.7e | 8.0cd |
| Seaside | 11.7ab | 6.0a-c | 7.0a |
| Southshore | 16.7a-c | 7.3de | 8.0cd |
| SR 7100 | 45.0e | 5.7ab | 8.3de |
| Tendez | 45.0e | 5.3a | 8.7e |
| Trueline | 26.7a-d | 6.7b-e | 7.0a |

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

[2] Percent Poa annua evaluations are a visual estimate of percent of the plot covered with annual bluegrass.

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

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

## Buffalograss Cultivar Quality Evaluation

*T.B. Voigt and J.E. Haley*

| | |
|---|---|
| **Research Protocol:** | **1991 NTEP Buffalograss Cultivar Trials** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | area rotary tilled; fertilized at 1 lb N/M. |
| **Seeding/ Establishment:** | seeding date - June 28, 1991; plugging rate - 6 to 24 plugs/plot; plot size - 7 ft x 7 ft; irrigation - to insure establishment; pesticides - preemergence application of Simazine. |
| **Plot Maintenance:** | mowing height - 2.0 inches; |
| **1991** | pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none after establishment; fertilization - none after establishment. |
| **1992** | pesticides - broad spectrum postemergence broadleaf herbicide; irrigation - none; fertilization - none. |
| **1993** | pesticides - broad spectrum postemergence broadleaf herbicide, preemergence control with Princep in April and July; irrigation - none; fertilization - none. |
| **1994** | irrigation - none; fertilization - 1 lb N/M in June. |
| **Experimental Design:** | RCB; 3 replications. |

Interest in drought and heat tolerant grasses for Illinois has increased as a result of the severe growing conditions during the 1988 and 1991 growing seasons. Many warm season grasses exhibit great tolerance for hot and dry conditions and limited management inputs. Not all warm season grasses, however, tolerate the winter conditions of Illinois. Buffalograss *(Buchloe dactyloides)* is a warm season species currently receiving attention from turfgrass researchers and managers because it is tolerant of temperature and moisture extremes, is adaptable to many sites, requires limited maintenance, and has few pest problems. This research evaluates the quality of twenty-two buffalograss cultivars and their performance in central Illinois during the 1994 growing seasons.

All plots were installed using plants produced at the University of Nebraska. The plants originated as vegetatively produced clones of a single genotype, or as plants selected from a seeded population. Table 1 provides a list of cultivars planted, their producers, and whether they have a vegetative or seed origin.

Objectives were formulated for this research. The objectives are:

- to determine if there are differences among the performance twenty-two buffalograss cultivars;

- to determine which buffalograss cultivars perform best in central Illinois; and
- to produce buffalograss cultivar recommendations based on performance.

Buffalograss quality performance can, to a great degree, be related to the weather conditions during the evaluations. Both the 1992 and 1993 growing seasons were wet in Urbana, and the 1992 season was also particularly cool. Under these conditions, cool season grasses and weeds were able to invade warm season grasses and become a greater problem than in typical years. Although buffalograss can perform acceptably under typical conditions, cool season plants less tolerant of heat and drought are very competitive during wet periods. Couple this with cool growing season in 1992 and it is easy to explain the low buffalograss quality ratings. Herbicides can be used to control many of these weeds, but it is questionable if buffalograss warrants increased maintenance and labor inputs. Only individual turf managers can make this decision.

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

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

During typical Urbana summers, hot, dry periods are common. The 1994 growing season had conditions more typical and ratings were higher than during the past two years.

There were significant differences among the twenty-two cultivars in the evaluation as determine by statistical testing. The overall means for the eleven evaluations appear in Table 2. Means were separated using Fisher's Protected LSD (Table 2).

Based on results of quality evaluations in 1992, 1993 (see 1992 and 1993 Illinois Turfgrass Research Reports) and 1994, it is obvious that there are significant differences among the twenty-two buffalograss cultivars included in the study. In 1994, 'NE 84-315,' 'NE 84-436,' 'NE 84-609,' 'NTDG-3,' 'NTDG-4,' 'NTDG-5' produced above average quality ratings during each of the 5 monthly evaluation periods. When combined with 1992 and 1993 results the cultivars that had above average monthly quality ratings for each of the sixteen evaluations were 'NE 84-315,' 'NTDG 3,' 'NTDG 4,' and 'NTDG 5'. Based on our evaluation criteria, these types produced an acceptable low- to moderate-quality turf, and would be recommended for planting in Illinois.

**Table 12.** Means of twenty-two buffalograss cultivars evaluated for turf quality in 1994.[1]

| Cultivar | Spring Greenup[2] | Color[3] | Quality[4] May | June | July | August | Sept |
|---|---|---|---|---|---|---|---|
| AZ143 | 3.3ef | 3.7b-d | 3.0b-d | 3.7c-e | 4.3e-h | 3.7bc | 2.7a-c |
| BAM101 | 1.0a | 4.0c-e | 2.0ab | 3.3b-d | 2.7b-d | 3.7bc | 4.7fg |
| BAM202 | 2.3b-e | 4.3c-e | 2.3a-c | 4.0c-e | 4.3e-h | 4.0bc | 4.3e-g |
| Bison | 1.3ab | 4.0c-e | 2.7a-c | 3.0b-d | 3.3c-e | 3.7bc | 3.3b-e |
| Bufflawn | 1.0a | 3.3a-c | 1.7a | 1.3a | 2.0ab | 2.0a | 2.7a-c |
| Highlight 15 | 1.3ab | 2.3a | 1.7a | 1.3a | 1.7ab | 1.7a | 2.0a |
| Highlight 25 | 1.0a | 3.3a-c | 1.7a | 2.7a-c | 1.0a | 2.0a | 2.0a |
| Highlight 4 | 1.0a | 2.7ab | 2.0ab | 2.0ab | 1.7ab | 1.7a | 2.7a--c |
| NE 84-315 | 4.0f | 3.3a-c | 4.0d | 4.0c-e | 5.0gh | 4.0bc | 4.0d-g |
| NE 84-436 | 3.3ef | 4.0c-e | 3.3cd | 4.3de | 4.7f-h | 4.3bc | 4.0d-g |
| NE 84-45-3 | 2.0a-d | 3.7b-d | 2.3a-c | 2.7a-c | 2.3bc | 3.3b | 3.0a-d |
| NE 84-609 | 2.7c-e | 5.0e | 3.0b-d | 4.3de | 5.3h | 4.3bc | 5.0g |
| NE 85-378 | 3.0d-f | 3.3a-c | 2.7a-c | 5.0e | 4.3e-h | 4.0bc | 3.3b-e |
| NTDG-1 | 2.0a-d | 3.7b-d | 2.3a-c | 4.3de | 4.3e-h | 4.0bc | 4.0d-g |
| NTDG-2 | 1.3ab | 4.0c-e | 2.3a-c | 4.0c-e | 4.3e-h | 4.3bc | 4.0d-g |
| NTDG-3 | 3.0d-f | 3.7b-d | 3.3cd | 5.0e | 5.0gh | 4.7c | 4.0d-g |
| NTDG-4 | 2.3b-e | 3.7b-d | 2.7a-c | 4.0c-e | 4.7f-h | 4.3bc | 4.3e-g |
| NTDG-5 | 3.0d-f | 3.7b-d | 3.0b-d | 4.3de | 4.7f-h | 4.0bc | 3.7c-f |
| Prairie | 1.3ab | 4.7de | 2.0ab | 4.3de | 4.0e-g | 4.0bc | 4.7g |
| Rutgers | 1.3ab | 3.7b-d | 1.7a | 1.3a | 2.0ab | 1.7a | 2.3ab |
| Sharps Improved | 3.0d-f | 3.7b-d | 2.3a-c | 4.0c-e | 4.3e-h | 4.0bc | 3.7c-f |
| Texoka | 2.3b-e | 3.7b-d | 2.3a-c | 3.0b-d | 3.7d-f | 3.3b | 4.0d-g |
| LSD.05 | 1.1 | 1.1 | 1.0 | 1.6 | 1.1 | 1.2 | 1.2 |

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

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

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

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

Weather conditions play a great role in the quality of all twenty-two buffalograss cultivars. When conditions are hot and dry, several buffalograss cultivars can prove to be a serviceable turf. During the 1994 growing season, several of these buffalograsses performed acceptably in June, July and August. All of these buffalograsses, however, were incapable of of out-competing most established weeds, especially cool seson perennial weeds. Thus, to improve buffalograss quality and control weeds, herbicides should be used, but the turf manager must determine if buffalograss is worth this degree of culture. If higher management inputs are an option, there are other grasses capable of producing higher quality turf.

Additional research is planned to further evaluate these twenty-two buffalograss cultivars in varied environmental and management conditions. In the future, a complete package of buffalograss selection, use, and culture recommendations will be developed for Illinois.

# 1991 NTEP Zoysiagrass Cultivar Trials

*T. B. Voigt and J. E. Haley*

| | |
|---|---|
| **Research Protocol:** | **1991 NTEP Zoysiagrass Cultivar Trials** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | area rotary tilled; fertilized at 1 lb N/M. |
| **Seeding/ Establishment:** | seeding date - June 28, 1991<br>plugging rate - 6 to 24 plugs/plot;<br>plot size - 7 ft x 7 ft;<br>irrigation - to insure establishment;<br>pesticides - preemergence application of Simazine. |
| **Plot Maintenance:** | mowing height - 2.0 inches; |
| **1991** | pesticides - broad spectrum postemergence broadleaf herbicide;<br>irrigation - none after establishment;<br>fertilization - none after establishment. |
| **1992** | pesticides - broad spectrum postemergence broadleaf herbicide;<br>irrigation - none;<br>fertilization - none. |
| **1993** | pesticides - broad spectrum postemergence broadleaf herbicide, preemergence control with Princep in April and July;<br>irrigation - none;<br>fertilization - none. |
| **1994** | irrigation - none;<br>fertilization - 1 llb N/M/yr. |
| **Experimental Design:** | RCB;<br>3 replications. |

In the southern portions of the Midwest, warm season grasses often perform better in the summer than cool season grasses. During periods of heat and drought unirrigated Kentucky bluegrasses, fine fescues, and perennial ryegrasses will go dormant, while zoysiagrass, bermudagrass, and buffalograss will continue to grow and provide good quality turf.

Zoysiagrass (*Zoysia* spp.) is of particular interest due to its many positive attributes. It is extremely heat and drought tolerant; is dense and tough; tolerates wear well; resists weed invasions after establishment; tolerates light to moderate shade; and has limited insect and disease problems. There are, however, some drawbacks to the use of zoysiagrass. These include its short growing season; its brown appearance when dormant (usually from mid October to Mid May in Urbana); its slow growth and high cost of establishment; its ability to invade areas in which it is unwanted; and its high thatch production. Taken in total, zoysiagrass can be a useful turfgrass in the Midwest, provided its positive attributes are capitalized upon and its negative properties are understood and minimized.

During the summer of 1991, a Zoysiagrass National Turfgrass Evaluation Program (NTEP) study was initiated in Urbana. The twenty-four zoysiagrass cultivars, sources, and origins are listed in Tables 1. The purpose of these trials is to evaluate zoysiagrass selections for their suitability for utility or lawn uses in the northern two-thirds of Illinois, with primary interest in overall turf quality. Data has been collected since 1992, and the evaluation is scheduled to last three to five years.

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

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

There were significant differences in overall zoysiagrass quality at each of the five monthly evaluations (Table 2). Zoysiagrass quality performance was evaluated each month, May through September. Overall quality was evaluated on a one through nine scale with one being dead or completely dormant, five being minimally acceptable for lawn use, and nine as being extremely high quality. Ratings were based on turf color, density, rate of spread, texture, and uniformity. In addition, spring greenup ratings were taken in May (1 through 9 scale with 1 being completely brown, 5 being minimally acceptable, and 9 being green and actively growing) and genetic color rating taken in September (1 through 9 scale with 1 being completely brown, 5 being minimally acceptable, and 9 being green and actively growing).

Nine of the selections, 'Belair;' 'CD2013;' 'CD259-13;' 'GT2047;' 'JZ-1;' 'Korean Common;' 'Sunburst;' 'TC5018;' 'TGS-W10;' and 'TGSB10,' produced consistently high quality turf throughout the 1994 growing season. These nine, of the twenty-four in the evaluation, were the only cultivars with quality ratings in the upper half of the entire group at each monthly evaluation.

When combined with 1992 and 1993 data (see *1992* and *1993 Illinois Turfgrass Research Reports*), only two cultivars were rated in the upper half of the group at each of the eleven evaluations. These top performers were, 'CD259-13' and 'TC5018.'

In 1994, the overall performance of these grasses surpassed 1992 and 1993. Warmer, drier weather conditions in Urbana favored warm season grass growth during 1994 as compared to the wetter conditions of 1992 and 1993. It is too early, however, to make zoysiagrass recommendations for the northern two-thirds of Illinois. This test will continue for at least two more years, and only after the conclusion of this trial will recommendations be made.

**Table 14.** Quality ratings for the 1991 NTEP zoysiagrass evaluation in Urbana, Illinois during the 1994 growing season.[1]

| Cultivar | Spring Greenup[2] | Color[3] | Quality[4] 5/12 | 6/11 | 7/29 | 8/27 | 9/30 |
|---|---|---|---|---|---|---|---|
| Belair | 2.7cd | 5.0b-d | 2.7de | 6.0g | 5.7fg | 5.3gh | 5.3f-h |
| CD2013 | 2.0b | 4.0a-c | 2.7de | 3.3cd | 4.7d-g | 4.3d-g | 5.3f-h |
| CD259-13 | 3.0d | 5.0b-d | 3.0e | 5.7fg | 5.7fg | 5.7gh | 6.0h |
| DALZ8501 | 2.0b | 4.7b-d | 2.3c-e | 1.3ab | 3.3a-d | 2.0ab | 3.0a-c |
| DALZ8502 | 1.0a | 2.7a | 1.0a | 2.3bc | 2.0a | 1.0a | 2.0a |
| DALZ8507 | 1.0a | 6.0d | 2.0b-d | 1.3ab | 3.7b-e | 3.3b-e | 3.3a-d |
| DALZ8508 | 1.0a | 5.0b-d | 2.0b-d | 2.0ab | 2.7ab | 2.7bc | 2.3ab |
| DALZ8512 | 1.0a | 4.7b-d | 2.0b-d | 2.3bc | 5.0e-g | 4.7e-h | 6.0h |
| DALZ8514 | 1.0a | 3.7ab | 2.3c-e | 2.3bc | 3.0a-c | 3.7c-f | 4.0c-f |
| DALZ8516 | 1.0a | 2.7a | 1.7a-c | 1.0a | 2.0a | 2.0ab | 2.0a |
| DALZ8701 | 1.0a | 3.0a | 1.3ab | 1.3ab | 2.0a | 2.0ab | 3.0a-c |
| DALZ9006 | 1.0a | 5.0b-d | 2.0b-d | 1.0a | 3.0a-c | 2.3a-c | 2.3ab |
| El Toro | 1.0a | 5.0b-d | 2.0b-d | 2.3bc | 5.0e-g | 4.7e-h | 5.0e-h |
| Emerald | 1.0a | 5.0b-d | 2.0b-d | 2.3bc | 3.7b-e | 3.0b-d | 4.0c-f |
| GT2004 | 1.3a | 5.0b-d | 2.0b-d | 2.3bc | 4.3c-f | 3.7c-f | 4.3c-g |
| GT2047 | 2.3bc | 5.0b-d | 3.0e | 5.0fg | 5.3fg | 5.0f-h | 6.0h |
| JZ-1 lot A89-1 | 2.7cd | 5.0b-d | 3.0e | 5.0fg | 4.3c-f | 5.3gh | 5.7gh |
| Korean Common | 3.0d | 5.0b-d | 3.0e | 4.7ef | 5.0e-g | 5.3gh | 6.0h |
| Meyer | 2.0b | 4.7b-d | 2.7de | 3.3cd | 3.7b-e | 3.3b-e | 3.7b-e |
| Sunburst | 2.3bc | 4.7b-d | 2.7de | 3.7de | 4.3c-f | 3.7c-f | 4.7d-h |
| TC2033 | 1.0a | 6.0d | 2.0b-d | 2.3bc | 2.7ab | 3.3b-e | 4.0c-f |
| TC5018 | 2.7cd | 4.7b-d | 3.0e | 5.7fg | 5.7fg | 5.3gh | 6.0h |
| TGS-B10 | 3.0d | 4.7b-d | 2.7de | 5.3fg | 4.7d-g | 5.0f-h | 5.0e-h |
| TGS-W10 | 3.0d | 5.3cd | 3.0e | 4.7ef | 6.0g | 6.0h | 6.0h |
| LSD .05 | 0.7 | 1.6 | 0.8 | 1.2 | 1.5 | 1.5 | 1.5 |

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

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

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

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

# *CULTIVAR EVALUATION AT SOUTHERN ILLINOIS UNIVERSITY, CARBONDALE, IL.*

## NTEP Bentgrass Cultivar Trial

*Dr. Kenneth L. Diesburg*

| | |
|---|---|
| **Research Protocol:** | **NTEP Bentgrass Cultivar Trial** |
| **Location:** | Horticulture Research Center, Southern Illinois University, Carbondale. |
| **Site:** | Hosmer clay loam, pH 6.5. |
| **Seeding/ Establishment:** | seeding date - September 19, 1993; seeding rate - 0.5 lb/M; plot sixe - n6 ft x 6 ft. |
| **Plot Maintenance:** | mowing height - 9/32 inches; irrigation - to prevent stress; fertilization - 0.2 lb N/M every two weeks during growing season; topdressing - once/ month; October and November '93; April, May, October, November, '94; verticutting - once /month; November '93; April and May '94. |
| **Experimental Design:** | RCB; 3 replications. |

This is the second national trial of bentgrass cultivars. Advances from plant breeding have resulted in slower leaf elongaion and greater tiller density. It is difficult to achieve these traits and still maintain genetic vigor. During this year of establishment differences in vigor are more apparent than in subsequent years after the turf has matured. This evaluation is for golf course green application on native soil. The majority of older greens in the United States were established on native soil. This is still the case for many low-budget courses. Greens hold up much better if the root zone is modified to inhibit compaction. But green construction to incorporate drainage, irrigation, and root zone modification is expensive.

**Table 1.** Bentgrass cultivar performance

| Cultivar | Percent Stand[1] | | | | | |
|---|---|---|---|---|---|---|
| | 5/6 | 6/4 | 7/4 | 8/9 | 10/22 | Avg |
| A-4 | 63 | 74 | 78 | 95 | 94 | 81 |
| Syn 92-2-93 | 55 | 75 | 86 | 90 | 96 | 80 |
| Syn 92-5-93 | 52 | 77 | 85 | 89 | 92 | 79 |
| MSUEB | 45 | 71 | 81 | 94 | 87 | 76 |
| Crenshaw | 58 | 55 | 82 | 89 | 92 | 75 |
| Southshore | 51 | 67 | 67 | 93 | 96 | 75 |
| Providence | 50 | 69 | 74 | 84 | 94 | 74 |
| Regent | 57 | 53 | 78 | 89 | 83 | 72 |
| Lopez | 25 | 67 | 78 | 89 | 91 | 70 |
| SR 1020 | 55 | 63 | 63 | 72 | 95 | 70 |
| Penncross | 52 | 76 | 70 | 67 | 83 | 70 |
| Syn 92-1-93 | 33 | 63 | 83 | 68 | 89 | 67 |
| A-1 | 58 | 50 | 63 | 77 | 86 | 67 |
| L-93 | 41 | 53 | 77 | 80 | 83 | 67 |
| Syn-1-88 | 57 | 71 | 55 | 58 | 84 | 65 |
| DG-P | 30 | 42 | 73 | 88 | 91 | 65 |
| G-2 | 38 | 49 | 67 | 77 | 92 | 64 |
| Pennlinks | 18 | 55 | 74 | 84 | 90 | 64 |
| Cato | 33 | 52 | 65 | 64 | 88 | 60 |
| G-6 | 30 | 45 | 68 | 69 | 90 | 60 |
| 18th Green | 26 | 36 | 82 | 63 | 84 | 58 |
| Tendez | 8 | 40 | 70 | 79 | 88 | 57 |
| BAR Ws 42102 | 14 | 37 | 80 | 74 | 73 | 56 |
| BAR As 493 | 39 | 43 | 62 | 53 | 79 | 55 |
| PRO/CUP | 22 | 55 | 56 | 55 | 87 | 55 |
| ISI-Ap-89150 | 19 | 42 | 75 | 65 | 64 | 53 |
| Seaside | 34 | 54 | 48 | 38 | 75 | 50 |
| Trueline | 11 | 23 | 57 | 39 | 59 | 38 |
| $LSD_{0.05}$ | 34 | 24 | 21 | 34 | 22 | 8 |

[1] Percent area of plot covered with turf.

**Table 2.** Bentgrass cultivar performance.

| Cultivar | Turf Quality[1] 8/9 | 9/10 | 10/22 | Average |
|---|---|---|---|---|
| Syn 92-2-93 | 6.0 | 7.3 | 7.7 | 7.0 |
| A-4 | 6.0 | 6.7 | 8.3 | 7.0 |
| Crenshaw | 6.3 | 6.7 | 7.3 | 6.8 |
| Syn-92-5-93 | 5.7 | 7.0 | 7.0 | 6.6 |
| Pennlinks | 5.3 | 6.7 | 7.7 | 6.6 |
| MSUEB | 6.7 | 6.3 | 6.3 | 6.4 |
| L-93 | 5.7 | 6.0 | 7.3 | 6.3 |
| Southshore | 5.3 | 7.3 | 6.3 | 6.3 |
| Providence | 5.3 | 7.3 | 6.3 | 6.3 |
| Syn-92-1-93 | 4.3 | 6.3 | 8.0 | 6.2 |
| A-1 | 4.7 | 6.3 | 7.0 | 6.0 |
| Lopez | 5.0 | 5.7 | 7.0 | 5.9 |
| DG-P | 5.0 | 5.7 | 7.0 | 5.9 |
| G-2 | 4.3 | 5.7 | 7.3 | 5.8 |
| Regent | 5.3 | 6.3 | 5.7 | 5.8 |
| G-6 | 4.0 | 6.0 | 7.0 | 5.7 |
| Penncross | 4.0 | 6.0 | 6.7 | 5.6 |
| SR 1020 | 3.7 | 6.0 | 7.0 | 5.6 |
| Tendez | 5.0 | 6.0 | 5.0 | 5.3 |
| BAR Ws 42102 | 4.0 | 5.3 | 6.7 | 5.3 |
| PRO/CUP | 3.3 | 4.7 | 7.3 | 5.1 |
| Cato | 4.0 | 4.3 | 7.0 | 5.1 |
| ISI-Ap-89150 | 3.7 | 4.7 | 5.7 | 4.7 |
| Syn-1-88 | 3.3 | 5.7 | 4.7 | 4.6 |
| 18th Green | 3.7 | 4.3 | 4.0 | 4.0 |
| Trueline | 2.3 | 3.7 | 6.0 | 4.0 |
| BAR As 493 | 2.0 | 4.0 | 4.0 | 3.3 |
| Seaside | 2.0 | 4.7 | 3.0 | 3.2 |
| $LSD_{0.05}$ | 1.9 | 2.4 | 2.5 | 0.8 |

[1] Quality evaluations are made on a 1-9 scalewhere 9=excellent turfgrass quality and 1=verypoor turfgrass quality.

## NTEP Tall Fescue Cultivar Trial

*Dr. Kenneth L. Diesburg*

| | |
|---|---|
| **Location:** | Southern Illinois University, Carbondale, IL. |
| **Site:** | Hosmer Silt Clay Loam. |
| **Plot Maintenance:** | mowing height - 2.25 inches; pesticides - preemergent, Ronstar in April; and Barricade in June; postemergent, Turflon D in March; irrigation - none; fertilization - 4 lb N/M/yr, SCU, Nitroform, and Nutralene. |

Tall fescue is the dominant turfgrass species in southern Illinois. The combination of prolonged hot summer, poor soil, and periodic drought make the environment too harsh for Kentucky bluegrass in non-irrigated areas. Tall fescue becomes the cool-season species of choice. There has been a proliferation of tall fescue cultivars with the advent of the turf-type material. The most recent assemblage of cultivars from the USDA was planted at selected sites across the country in 1992. Among them is the first tall fescue cultivar developed from the turfgrass breeding program at Southern Illinois University, SIU-1.

Brown Patch pressure was not as severe this year as in the year of maturation of this trial, 1993. Nonetheless, there was enough pressure to differentiate cultivar tolearance. Tolerance to Brown Patch is the major factor influencing turfgrass quality ratings during the warmer months, June to September. Cultivars that otherwise have great color and density never did get ahead of the disease.

**Table 3.** Performance of tall fescue cultivars[1]

| Cultivar | Turf Quality[2] 4/28 | 6/3 | 7/4 | 8/11 | 9/10 | 10/22 | Avg | Brown Patch[3] % |
|---|---|---|---|---|---|---|---|---|
| MB-25-92 | 7.0 | 8.7 | 9.0 | 6.7 | 8.0 | 8.0 | 7.89 | 27 |
| Jaguar 3 | 7.0 | 7.0 | 9.0 | 6.7 | 8.0 | 8.3 | 7.67 | 36 |
| WXI-208-2 | 6.7 | 8.0 | 7.7 | 7.3 | 8.0 | 8.3 | 7.67 | 18 |
| Coronado | 7.7 | 8.3 | 9.0 | 5.7 | 7.0 | 8.3 | 7.67 | 41 |
| Lexus | 7.7 | 8.7 | 9.0 | 5.3 | 7.3 | 7.7 | 7.61 | 59 |
| Falcon 2 | 7.0 | 8.3 | 7.3 | 6.7 | 7.7 | 8.3 | 7.56 | 27 |
| Apache 2 | 6.3 | 7.7 | 9.0 | 6.3 | 8.0 | 7.7 | 7.50 | 35 |
| MB-23-92 | 7.3 | 7.3 | 8.0 | 6.3 | 8.7 | 7.0 | 7.44 | 37 |
| Pick 90-6 | 6.7 | 8.7 | 8.3 | 5.7 | 6.7 | 8.3 | 7.39 | 50 |
| Emperor | 8.3 | 7.3 | 8.3 | 4.7 | 7.7 | 8.0 | 7.39 | 35 |
| Pixie | 7.3 | 8.0 | 8.7 | 5.3 | 7.3 | 7.3 | 7.33 | 32 |
| PST-5DX w/endophyte | 6.0 | 7.3 | 8.7 | 5.7 | 7.7 | 8.0 | 7.22 | 25 |
| GEN-91 | .7 | 8.0 | 8.0 | 4.7 | 7.3 | 7.7 | 7.22 | 32 |
| Houndog V | 7.0 | 7.0 | 8.0 | 5.7 | 8.0 | 7.7 | 7.22 | 43 |
| ZPS-VL | 7.3 | 7.7 | 8.7 | 5.0 | 6.7 | 7.7 | 7.17 | 78 |
| PRO-9178 | 7.7 | 7.7 | 7.7 | 5.0 | 7.3 | 7.7 | 7.17 | 20 |
| Virtue | 7.0 | 7.7 | 7.3 | 5.0 | 7.7 | 8.3 | 7.17 | 12 |
| Pyramid | 6.7 | 7.7 | 7.7 | 6.0 | 6.7 | 8.0 | 7.13 | 28 |
| Tomahawk | 8.0 | 7.3 | 7.7 | 5.3 | 7.7 | 6.7 | 7.11 | 19 |
| MB-22-92 | 6.3 | 7.3 | 7.3 | 6.3 | 7.3 | 8.0 | 7.11 | 34 |
| Coyote | 7.0 | 7.7 | 8.0 | 6.0 | 7.0 | 7.0 | 7.11 | 39 |
| Trailblazer II | 7.0 | 7.7 | 7.3 | 5.7 | 7.0 | 8.0 | 7.11 | 37 |
| Pick 90-12 | 7.0 | 7.3 | 8.7 | 4.7 | 8.0 | 7.0 | 7.11 | 40 |
| QS-ST2 | 7.0 | 7.0 | 6.3 | 6.7 | 7.7 | 7.7 | 7.06 | 15 |
| Pick 90-10 | 6.3 | 8.3 | 8.7 | 4.7 | 6.7 | 7.7 | 7.06 | 57 |
| BAR Fa0855 | 7.0 | 6.7 | 7.0 | 5.7 | 8.3 | 7.7 | 7.06 | 34 |
| MB-24-92 | 6.7 | 7.3 | 7.0 | 6.3 | 7.3 | 7.3 | 7.00 | 44 |
| Lancer | 6.7 | 6.7 | 8.0 | 5.7 | 7.0 | 8.0 | 7.00 | 44 |
| ISI-AFA | 6.3 | 6.7 | 7.3 | 5.3 | 8.0 | 8.0 | 6.94 | 28 |
| M-2 | 7.7 | 6.3 | 7.0 | 5.7 | 7.3 | 7.7 | 6.94 | 16 |
| Bonsai Plus | 6.7 | 7.0 | 7.7 | 5.0 | 7.3 | 8.0 | 6.94 | 40 |
| ATF-007 | 6.3 | 7.7 | 8.7 | 4.7 | 7.0 | 7.0 | 6.89 | 62 |
| PST-5LX | 7.7 | 7.7 | 6.0 | 5.7 | 7.3 | 7.0 | 6.89 | 37 |
| FA-19 | 6.3 | 7.0 | 8.7 | 4.7 | 7.3 | 7.3 | 6.89 | 49 |
| $LSD_{0.05}$ | 1.6 | 1.8 | 2.0 | 1.7 | 2.0 | 1.9 | 1.5 | 37 |

*(continued)*

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

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

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

**Table 3.** Performance of tall fescue cultivars[1] *(continued)*

| Cultivar | Turf Quality[2] 4/28 | 6/3 | 7/4 | 8/11 | 9/10 | 10/22 | Avg | Brown Patch[3] % |
|---|---|---|---|---|---|---|---|---|
| FA-22 | 7.7 | 5.0 | 8.0 | 5.7 | 7.7 | 7.3 | 6.89 | 37 |
| Silverado | 7.3 | 6.3 | 6.0 | 5.7 | 8.0 | 7.7 | 6.83 | 26 |
| Rebel, Jr. | 7.3 | 6.7 | 6.7 | 5.0 | 8.3 | 7.0 | 6.83 | 28 |
| Mirage | 6.7 | 5.7 | 8.7 | 4.3 | 7.3 | 7.7 | 6.72 | 18 |
| Leprechaun | 6.3 | 6.7 | 7.3 | 6.0 | 7.0 | 7.0 | 6.72 | 41 |
| Finelawn Petite | 7.7 | 8.0 | 6.3 | 5.0 | 7.3 | 6.0 | 6.72 | 63 |
| Bonsai | 5.0 | 7.7 | 8.3 | 4.7 | 7.0 | 7.7 | 6.72 | 58 |
| Adobe | 5.7 | 7.0 | 8.0 | 5.3 | 7.3 | 6.7 | 6.67 | 65 |
| Duster | 6.7 | 8.0 | 7.3 | 5.3 | 6.3 | 6.3 | 6.67 | 61 |
| Micro DD | 7.0 | 6.7 | 7.7 | 5.3 | 6.7 | 6.7 | 6.67 | 37 |
| Eldorado | 7.0 | 6.7 | 6.0 | 6.0 | 7.7 | 6.7 | 6.67 | 73 |
| ATF-006 | 6.3 | 7.7 | 8.3 | 4.7 | 6.0 | 6.7 | 6.61 | 47 |
| Titan 2 | 7.3 | 6.3 | 7.3 | 5.3 | 7.0 | 6.3 | 6.61 | 19 |
| SR 8400 | 7.3 | 6.0 | 5.3 | 6.7 | 7.0 | 7.0 | 6.56 | 22 |
| SR 8210 | 6.7 | 6.7 | 6.7 | 5.7 | 6.3 | 7.3 | 6.56 | 44 |
| BAR Fa2AB | 7.0 | 6.3 | 7.0 | 5.0 | 6.7 | 7.0 | 6.50 | 47 |
| Vegas | 6.3 | 6.0 | 7.3 | 5.3 | 6.7 | 7.3 | 6.50 | 37 |
| Excalibur | 5.3 | 6.0 | 7.0 | 6.3 | 7.7 | 6.3 | 6.44 | 50 |
| PST-5PM | 6.3 | 6.0 | 8.0 | 4.3 | 7.0 | 6.7 | 6.39 | 45 |
| Shenandoah | 6.3 | 6.0 | 6.0 | 5.7 | 7.3 | 7.0 | 6.39 | 22 |
| Twilight | 5.3 | 6.0 | 7.0 | 5.7 | 7.3 | 7.0 | 6.39 | 14 |
| Minx | 6.3 | 7.0 | 6.7 | 5.3 | 6.3 | 6.7 | 6.39 | 12 |
| 403 | 6.3 | 6.0 | 6.7 | 5.7 | 7.0 | 6.7 | 6.39 | 18 |
| PST-5STB | 6.0 | 7.3 | 8.0 | 4.7 | 6.0 | 6.3 | 6.39 | 55 |
| Avanti | 5.7 | 6.0 | 6.0 | 5.7 | 7.3 | 7.3 | 6.33 | 17 |
| Kittyhawk | 6.3 | 5.7 | 7.7 | 5.3 | 6.7 | 6.3 | 6.33 | 68 |
| SR 8200 | 7.0 | 5.7 | 6.0 | 6.0 | 6.7 | 6.3 | 6.28 | 69 |
| OFI-TF-601 | 7.0 | 5.3 | 5.3 | 4.7 | 8.0 | 7.0 | 6.22 | 30 |
| Monarch | 6.0 | 6.0 | 6.3 | 5.0 | 7.0 | 7.0 | 6.22 | 23 |
| PST-5VC | 6.0 | 7.3 | 7.0 | 3.7 | 5.7 | 7.7 | 6.22 | 47 |
| Safari | 6.7 | 3.3 | 7.0 | 5.3 | 7.7 | 7.3 | 6.22 | 24 |
| CAS-LA20 | 6.3 | 6.7 | 5.7 | 6.0 | 6.7 | 6.0 | 6.22 | 22 |
| $LSD_{0.05}$ | 1.6 | 1.8 | 2.0 | 1.7 | 2.0 | 1.9 | 1.5 | 37 |

*(continued)*

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

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

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

**Table 3.** Performance of tall fescue cultivars[1] *(continued)*

| Cultivar | Turf Quality[2] | | | | | | | Brown Patch[3] |
|---|---|---|---|---|---|---|---|---|
| | 4/28 | 6/3 | 7/4 | 8/11 | 9/10 | 10/22 | Avg | % |
| Rebel-3D | 7.0 | 6.0 | 5.0 | 5.0 | 6.3 | 7.7 | 6.17 | 18 |
| Cochise | 6.7 | 6.0 | 5.3 | 5.3 | 7.0 | 6.7 | 6.17 | 35 |
| Pick CII | 6.3 | 5.3 | 6.7 | 5.0 | 6.0 | 7.3 | 6.11 | 27 |
| Guardian | 6.3 | 5.7 | 3.7 | 5.7 | 7.3 | 8.0 | 6.11 | 14 |
| ICI-CRC | 5.3 | 5.7 | 6.0 | 4.7 | 7.3 | 7.7 | 6.11 | 18 |
| Olympic II | 6.0 | 5.0 | 6.0 | 5.3 | 7.3 | 6.7 | 6.06 | 27 |
| PSTF-200 | 5.3 | 5.3 | 6.3 | 5.3 | 7.7 | 6.3 | 6.06 | 13 |
| ISI-ATK | 5.3 | 5.3 | 6.7 | 4.3 | 6.3 | 8.0 | 6.00 | 17 |
| Finelawn 88 | 7.3 | 5.0 | 6.3 | 4.0 | 6.7 | 6.3 | 5.94 | 28 |
| Montauk | 5.7 | 6.0 | 7.0 | 4.3 | 7.0 | 5.7 | 5.94 | 52 |
| BAR Fa 214 | 5.3 | 5.3 | 5.3 | 5.7 | 7.3 | 6.7 | 5.94 | 43 |
| CAS-MA21 | 6.0 | 6.3 | 5.0 | 5.3 | 6.3 | 6.3 | 5.89 | 36 |
| Duke | 5.7 | 6.7 | 6.3 | 5.0 | 5.0 | 6.3 | 5.83 | 17 |
| PSTF-401 | 5.7 | 5.3 | 5.7 | 5.0 | 7.3 | 5.7 | 5.78 | 16 |
| Alamo | 5.7 | 6.3 | 5.7 | 4.7 | 6.0 | 6.3 | 5.78 | 24 |
| SR 8300 | 6.7 | 5.0 | 5.3 | 5.7 | 6.0 | 5.7 | 5.72 | 35 |
| Cafa101 | 7.0 | 4.0 | 4.7 | 5.0 | 7.0 | 6.3 | 5.67 | 17 |
| QS-RH2 | 4.7 | 6.0 | 5.7 | 5.0 | 6.3 | 6.0 | 5.61 | 34 |
| Bonanza II | 5.7 | 5.3 | 5.3 | 4.0 | 6.7 | 5.7 | 5.44 | 78 |
| Astro 2000 | 5.7 | 4.0 | 5.3 | 4.7 | 7.0 | 6.0 | 5.44 | 34 |
| Austin | 6.3 | 4.7 | 4.7 | 4.0 | 6.7 | 5.7 | 5.33 | 18 |
| PSTF-LF | 5.7 | 4.7 | 5.3 | 4.7 | 6.0 | 5.7 | 5.33 | 21 |
| Bonanza | 5.3 | 3.7 | 3.3 | 5.3 | 7.0 | 6.3 | 5.17 | 51 |
| Phoenix | 6.0 | 4.0 | 3.7 | 4.7 | 6.7 | 5.3 | 5.06 | 12 |
| Cambridge | 5.7 | 4.7 | 4.3 | 3.7 | 5.3 | 5.7 | 4.89 | 36 |
| Falcon | 4.3 | 4.0 | 3.0 | 3.3 | 5.7 | 5.0 | 4.22 | 23 |
| Arid | 3.7 | 3.3 | 3.3 | 4.0 | 6.3 | 4.3 | 4.17 | 22 |
| Anthem | 3.3 | 4.0 | 2.7 | 3.0 | 4.3 | 6.0 | 3.89 | 7 |
| Ky-31 w/endo | 3.0 | 2.7 | 2.0 | 3.0 | 3.3 | 2.7 | 2.78 | 9 |
| Ky-31 wo/endo | 3.3 | 2.0 | 2.3 | 2.7 | 3.3 | 2.3 | 2.67 | 14 |
| Aztec | 2.0 | 1.3 | 1.3 | 1.7 | 2.0 | 2.7 | 1.83 | 22 |
| Alta | 1.0 | 0.7 | 0.7 | 1.2 | 2.3 | 4.5 | 1.72 | 11 |
| $LSD_{0.05}$ | 1.6 | 1.8 | 2.0 | 1.7 | 2.0 | 1.9 | 1.5 | 37 |

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

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

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

# Low Input Sustainable Turf (LIST)

*Dr. Kenneth L. Diesburg*

| | |
|---|---|
| **Research Protocol:** | **Low Input Sustainable Turf (LIST)** |
| **Locations:** | Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota. |
| **Seeding Dates:** | cool season grasses - 9/21/92; warm season grasses - 5/2/93. |
| **Species:** | 1. sheep fescue<br>2. redtop<br>3. Kentucky bluegrass<br>4. buffalograss<br>5. tall fescue<br>6. hard fescue<br>7. colonial bentgrass<br>8. zoysiagrass. |
| **Mowing Frequencies:** | 1. alternate weeks<br>2. once per month<br>3. twice per year. |
| **Site Preparation:** | pesticides - preemergent (Tupersan) on cool season grasses;<br>fertilization - 1/2 lb N/M (1-4-1) starter in spring. |
| **Plot Maintenance:** | fertilization - 1 lb N/M/yr, SCU;<br>mowing height - 3 inchers;<br>pesticides - none;<br>irrigation - none. |
| **Experimental Design:** | strip-plot;<br>3 replications |

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

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

Buffalograss and zoysiagrass were planted during May 1993 but establishment was poor in two of the three replications. Their performance during 1994 was, therefore, poor. During spring tall fescue had the best turf quality due to its vegetative vigor. Redtop`Barricuda', Colonial Bentgrass Experimental, and Red Fescue`Cindy' performed just as well. During summer stress tall fescue and `Cindy' had lower turf quality while Hard Fescue`9032', Colonial Bentgrass`Exeter', and Hard Fescue'Scaldis' were among the best entries. Near the end of the season colonial bentgrass performed significantly better than any other entry.

Clipping every other week favored Colonial Bentgrass Experimental during spring and fall. It favored all the fine fescues during spring. But it caused lower turf quality in tall fescue during the fall. Clipping once per month favored Redtop`Streaker' and Sheep Fescue during summer, and it favored Red Fescue`Cindy', the redtops, and Zoysiagrass during fall. Clipping twice per year failed to improve turfgrass quality for any of the entries.

**Table 4.** Performance of LIST species during spring[1].

| | Turf Quality[2] | | | |
|---|---|---|---|---|
| Species/Cultivar | Alternate Weeks | Once/ Month | Twice/ Year | Average |
| Tall Fescue w/endo`Kentucky-31' | 6.8 | 5.7 | 5.2 | 5.9 |
| Tall Fescue wo/endo`Kentucky-31' | 5.8 | 5.8 | 5.7 | 5.8 |
| Redtop`Barricuda' | 5.5 | 4.7 | 6.2 | 5.4 |
| Colonial Bentgrass Experimental | 6.3 | 4.7 | 5.0 | 5.3 |
| Red Fescue`Cindy" | 5.3 | 5.7 | 4.7 | 5.2 |
| Hard Fescue`Scaldis' | 6.0 | 5.5 | 3.8 | 5.1 |
| Redtop`Streaker' | 5.3 | 4.7 | 4.8 | 4.9 |
| Colonial Bentgrass`Exeter' | 5.2 | 5.3 | 4.0 | 4.8 |
| Hard Fescue`9032' | 5.0 | 4.7 | 4.8 | 4.8 |
| Hard Fescue`Valda' | 5.2 | 4.7 | 4.2 | 4.7 |
| Sheep Fescue | 5.2 | 4.7 | 3.5 | 4.4 |
| Kentucky Bluegrass`SD Common' | 3.5 | 4.5 | 4.0 | 4.0 |
| Zoysiagrass`Chinese Common' | 3.8 | 4.0 | 3.2 | 3.7 |
| Buffalograss`Sharps Improved' | 2.3 | 2.2 | 1.7 | 2.1 |
| $LSD_{0.05}$ | 0.8 | 0.8 | 0.8 | 0.8 |

**Table 5.** Performance of LIST species during summer.[1]

| | Turf Quality[2] | | | |
|---|---|---|---|---|
| Species/Cultivar | Alternate Weeks | Once/ Month | Twice/ Year | Average |
| Colonial Bentgrass Experimental | 6.2 | 5.8 | 6.2 | 6.1 |
| Redtop`Barricuda' | 5.2 | 5.8 | 6.7 | 5.9 |
| Colonial Bentgrass `Exeter' | 5.0 | 5.8 | 5.5 | 5.4 |
| Hard Fescue `9032' | 5.7 | 4.7 | 5.0 | 5.1 |
| Hard Fescue `Scaldis' | 5.5 | 5.3 | 4.0 | 4.9 |
| Tall Fescue w/endo `Kentucky-31' | 4.5 | 4.8 | 5.2 | 4.8 |
| Red Fescue `Cindy' | 4.2 | 5.2 | 4.5 | 4.6 |
| Redtop `Streaker' | 3.5 | 5.5 | 3.7 | 4.2 |
| Hard Fescue `Valda' | 4.8 | 4.3 | 3.0 | 4.1 |
| Zoysiagrass`Chinese Common' | 3.7 | 4.3 | 3.3 | 3.8 |
| Sheep Fescue | 3.7 | 4.8 | 3.0 | 3.7 |
| Tall Fescue wo/endo `Kentucky-31' | 3.5 | 3.8 | 3.7 | 3.7 |
| Kentucky Bluegrass `SD Common' | 2.5 | 3.2 | 2.8 | 2.8 |
| Buffalograss`Sharps Improved' | 2.8 | 2.8 | 1.3 | 2.3 |
| $LSD_{0.05}$ | 1.2 | 1.2 | 1.2 | 1.2 |

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

[2] Ratings based on a scale of 1 to 9, 9=uniform and complete stand and 1=no stand.

**Table 6.** Performance of LIST species during fall.[1].

| | Turf Quality[2] | | | |
|---|---|---|---|---|
| Species/Cultivar | Alternate Weeks | Once/ Month | Twice/ Year | Average |
| Colonial Bentgrass Experimental | 8.7 | 7.3 | 7.7 | 7.9 |
| Colonial Bentgrass `Exeter' | 7.0 | 6.7 | 6.7 | 6.8 |
| Red Fescue `Cindy' | 5.7 | 7.3 | 5.3 | 6.1 |
| Hard Fescue `9032' | 6.3 | 6.0 | 6.0 | 6.1 |
| Tall Fescue w/endo `Kentucky-31' | 5.0 | 6.3 | 6.7 | 6.0 |
| Hard Fescue `Scaldis' | 6.3 | 5.7 | 4.0 | 5.3 |
| Tall Fescue wo/endo `Kentucky-31' | 4.0 | 5.3 | 6.0 | 5.1 |
| Redtop `Barricuda' | 4.3 | 6.0 | 5.0 | 5.1 |
| Sheep Fescue | 4.3 | 4.7 | 4.0 | 4.3 |
| Hard Fescue `Valda' | 4.7 | 4.7 | 3.7 | 4.3 |
| Zoysiagrass`Chinese Common' | 4.0 | 5.7 | 3.3 | 4.3 |
| Redtop `Streaker' | 3.7 | 5.3 | 4.0 | 4.3 |
| Buffalograss`Sharps Improved' | 3.3 | 4.0 | 3.0 | 3.4 |
| Kentucky Bluegrass `SD Common' | 3.0 | 3.0 | 2.0 | 2.7 |
| $LSD_{0.05}$ | 1.2 | 1.2 | 1.2 | 1.2 |

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

[2] Ratings based on a scale of 1 to 9, 9=uniform and complete stand and 1=no stand.

# *TURFGRASS MANAGEMENT EVALUATIONS AT THE UNIVERSITY OF ILLINOIS*

## Tall Fescue Management

*J.E. Haley and T.B. Voigt*

| | |
|---|---|
| **Fertility Treatments:** | 0 lb N/M; 2 lbs N/M/yr applied 1 lb in May & Sept; 4 lbs N/M/yr applied 0.5 lb in June, July & 1 lb in May, Aug., Oct.; 6 lbs N/M/yr applied 0.5 lb Apr, July & 1 lb in May, June, Aug., Sept.,Oct.; fertilizers were broadcast by hand. |
| **Mowing Treatments:** | 1 inch, 2 inches, 3 inches mowing height; A rotary mower is used and clippings were removed and discarded. |
| **Experimental Design:** | strip plot (fertilization, randomized in block, mowing height stripped); 3 replications. |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |

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

Tall fescue quality was highest where the turf was fertilized with 4 or 6 lbs of nitrogen annually and when mowed at 2 or 3 inches in height. Annual bluegrass *(P. annua)*

**Table 1.** The evaluation of 4 fertility levels and 3 mowing heights when applied to a tall fescue turf blend during the 1994 growing season.[1]

| Fertility Level[3] | Quality[2] 4/25 | 5/26 | 7/08 | 8/05 | 9/01 | 9/28 |
|---|---|---|---|---|---|---|
| 0 lb | 3.3a | 4.2a | 3.1a | 4.0a | 3.4a | 3.8a |
| 2 lbs | 4.6b | 4.6a | 4.6b | 4.9a | 4.4b | 5.0b |
| 4 lbs | 6.0c | 5.6b | 5.4c | 6.3b | 6.2c | 6.0b |
| 6 lbs | 6.3c | 5.8b | 6.7d | 6.2b | 6.4c | 6.1b |

*(continued)*

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

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

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

| | |
|---|---|
| **Research Protocol:** | **Tall Fescue Management Evaluation** |
| **Seeding/ Establishment:** | establishment date - spring,1989;<br>turf - mature Triathalawn tall fescue (Bonanza, Olympia, and Apache blend);<br>plot size - 5 ft x 6 ft;<br>pesticides - none. |
| **Plot Maintenance:** | pesticides - none, weeded by hand 8/89;<br>irrigation - none; |
| **1989** | fertilization - treatments applied on May 10, June 1, June 22, July 14, Aug. 11 Sept. 12, Oct. 11. |
| **1990** | fertilization - treatments applied on Apr. 17, May 18, June 21, July 11, Sept. 13 & Oct. 19. |
| **1991** | fertilization - treatments applied on Apr. 26, May 28, June 20, Aug. 5, Aug. 28, Sept. 26, Oct. 21. |
| **1992** | fertilization - treatments applied on Apr. 23, May 17, June 16, July 15, Aug. 21, Sept. 22, Oct. 15. |
| **1993** | fertilization - treatments applied on Apr. 20, May 19, June 16, July 15, Aug. 23, Sept. 1 6, Oct. 19. |
| **1994** | fertilization - treatments applied on Apr. 27, May 27, June 23, July 18, Aug. 17, Sept. 1 5, Oct. 17. |

populations were greatest in tall fescue maintained at a 1 or 2 inch mowing height. There was no significant difference among annual bluegrass populations at the 4 levels of nitrogen fertilization. Mowing height effected crabgrass invasion. Crabgrass populations increased as mowing height decreased. Broadleaf weed populations were largely effected by nitrogen fertilization. Tall fescue that was not fertilized had significantly higher broadleaf weed populations than turf fertilized with any rate of nitrogen. Turf fertilized at 2 lbs N/M/yr had significantly more broadleaf weeds than turf fertilized at 6 lbs N/M/yr. Broadleaf weed populations consisted primarily of white clover. Based on these preliminary results, it appears that improved tall fescue cultivars benefit from nitrogen fertilization. Even a low annual rate of nitrogen fertilization can decrease broadleaf weed populations and reduce or eliminate the need for herbicide control. Tall fescue should be mowed at a minimum of 2 inches in height.

**Table 1.** The evaluation of 4 fertility levels and 3 mowing heights when applied to a tall fescue turf blend during the 1994 growing season.[1] *(continued)*

| Mowing | Quality[2] | | | | | |
|---|---|---|---|---|---|---|
| Height | 4/25 | 5/26 | 7/08 | 8/05 | 9/01 | 9/28 |
| 1 inch | 3.8a | 3.8a | 3.4a | 3.7a | 3.8a | 3.1a |
| 2 inches | 5.6b | 5.2b | 5.0b | 5.6b | 5.3b | 5.8b |
| 3 inches | 5.8b | 6.0b | 6.4c | 6.8c | 6.3b | 6.8c |

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

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

**Table 2.** The evaluation of weed invasion in a tall fescue turf blend maintained at 4 fertility levels and 3 mowing heights during the 1994 growing season.[1]

| Fertility Level[5] | % Poa annua[2] 4/25$^{ns}$ | % Crabgrass[3] 8/9ns | % Broadleaf[4] 8/9 |
|---|---|---|---|
| 0 lb | 0.2 | 4.7 | 48.9c |
| 2 lbs | 6.9 | 10.6 | 18.9b |
| 4 lbs | 8.3 | 8.9 | 6.6ab |
| 6 lbs | 9.4 | 7.9 | 1.2a |

| Mowing Height | % Poa annua 4/25 | % Crabgrass 8/9 | % Broadleaf 8/9$^{ns}$ |
|---|---|---|---|
| 1 inch | 16.4b | 18.8c | 22.6 |
| 2 inches | 2.2a | 4.8b | 18.8 |
| 3 inches | 0.0a | 0.4a | 15.3 |

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

*J.E. Haley, T.B. Voigt, W. C. Sullivan and Irene Miles*

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

It is assumed that consumers demand lawns completely free of weeds, insects and diseases. A considerable portion of the service the lawn care industry provides involves fertilizing, and applying herbicides and insecticides to residential and commercial lawns (Watson et. al., 1992). Fertilizer and pesticide applications most often occur at scheduled intervals primarily for business, rather than agronomic reasons. A predetermined schedule

[1]All values represent the mean of 3 replications. Means in the same column with the same letter are not significantly different at the 0.05 level as determined by Fisher's Protected Least Significant Difference test.
[2]Percent Poa annua refers to the percent of the plot area covered with annual bluegrass.
[3]Percent crabgrass refers to the percent of the plot area covered with crabgrass plants..
[4]Percent broadleaf refers to the percent of the plot area covered with broadleaf weeds. In this evaluation the broadleafweed population was made up of primarily white clover.
[5]Fertility refers to the total amount of nitrogen in pounds per 1000 square feet applied annually.
$^{ns}$ No significant difference was found among the means in this group of data.

allows the most efficient access to the greatest number of lawns. In addition to using a predetermined schedule, lawn care companies apply pesticides to entire turf areas, regardless of pest presence or absence, because this method requires less employee training and time.

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

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

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

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

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

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

The objectives of this study are to:

A. determine the performance levels of each management regime by rating weed, insect, and disease levels and measuring quantities of applied

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

pesticides;

B. determine preference for turf associated with each treatment, by three distinct groups; and

C. determine the influence of receiving management information on turf quality evaluations.

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

During 1994 the plots were evaluated by turf specialists on one occasion, homeowners on 2 occasions and throughout the growing season by one turf researcher from the University of Illinois. Only the researcher's evaluations are presented here (Table 3). At the time of evaluation by the groups, the PLC plots had received preemergence crabgrass control herbicide 2 times, postemergence broadleaf control herbicide 4 times, and insecticide 3 times during the course of the study. The IPM1 plots had received postemergence broadleaf control herbicide 4 times, and no crabgrass control or insecticide. IPM2 plots were treated 2 times with postemergence broadleaf control herbicide and received no crabgrass herbicide or insecticide. Turf quality appeared to be most effected by fertilizer source and applications. No significant difference was observed between the PLC treatment and the IPM 1 treatment on any of the evaluation dates (Table 3). April through June no significant differences were observed between the IPM 2 program and IPM 1 or PLC program. Lower quality of the IPM 2 plots July through October was a result of increasing weed populations. The organic program produced turf quality rated only as fair. This is probably due to the slower nitrogen release properties of the organic fertilizer. Turf density in these plots was poor and weed populations were able to grow.

**Table 3.** The evaluation of 5 home lawn management programs during 1994.[1]

| Management | Quality[2] | | | | | |
|---|---|---|---|---|---|---|
| Program | 4/18 | 5/23 | 6/29 | 7/17 | 8/05 | 9/27 |
| PLC | 7.3c | 7.3c | 4.3a | 5.3b | 5.0c | 6.3bc |
| Organic | 6.0b | 5.3b | 3.0a | 5.0b | 3.7ab | 2.7a |
| IPM 1 | 7.3c | 7.7c | 3.7a | 7.3c | 6.3d | 7.3c |
| IPM 2 | 7.0c | 6.0b | 4.0a | 6.7c | 4.3bc | 5.7b |
| untreated | 4.0a | 3.3a | 3.7a | 3.0a | 2.7a | 1.7a |

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

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

# Turfgrass Evaluations at the Chicago Botanic Garden

*Ken Bilow, Tom Voigt, and Richard Hawke*

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| **Research Protocol:** | **Turfgrass Evaluations at the Chicago Botanic Garden** |
| **Location:** | Chicago Botanic Garden, Glencoe, IL |
| **Seeding/ Establishment:** | site preparation - spring/summer 1992; seeding rate - Poa supina, 1 lb/M; sheep fescue, 3.5 lbs/M; Silvania hard fescue, 3.5 lbs/M; Fuft's weeping alkaligrass, 2.5 lbs/M; tall fescue, 6 lbs/M; Kentucky bluegrass, 3.5 lbs/M buffalograss, plugsl irrigation - none. |
| **Plot Maintenance:** | mowing height - tall fescue and Kentucky bluegrass, 3 inches. |
| **Fertilizer Source:** | Milorganite (5-2-0)<br>Once (33-1-10)<br>Ringers (9-2-4)<br>Scott's Lawn Reviver (9-2-4)<br>Scott's Turf Builder (34-4-8 )<br>rate - all applied at 4 lbs N/M/yr. |
| **Experimental Design:** | RCB;<br>3 replications. |

Many professional turfgrass managers believe that labor and pesticide inputs are reduced when the proper turfgrass for a given use, environmental setting, and cultural regime is planted. This stands to reason; a turf that is well-adapted to its surroundings will suffer fewer stresses and be better able to tolerate occasional problems than a turf that is poorly adapted to a growing situation having reduced tolerances to problems.

This research was initiated by the Chicago Botanic Garden and the University of Illinois Department of Horticulture to evaluate turfgrasses specifically for the North Shore and North Suburban areas of Chicagoland. The objectives of this work are:

1. To evaluate several alternative turfgrass species (*Poa supina*, sheep fescue, Silvania hard fescue, Fult's weeping alkaligrass, and buffalograss) when maintained with different nitrogen sources; and

2. To evaluate ten tall fescue and ten Kentucky bluegrass cultivars for performance in the North Shore area when maintained with different nitrogen sources.

The ten tall fescue cultivars studied were:

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|---|---|
| Avanti | Rebel Jr. |
| Bonzai | Shortstop |
| Crewcut | Silverado |
| Crossfire | Trailblazer II |
| Monarch | Twilight |

The ten Kentucky bluegrass cultivars studied were:

| | |
|---|---|
| Alene | Midnight |
| Argyle | Parade |
| Asset | Park |
| BA73-366 | S-22 |
| Kenblue | Washington |

These studies were evaluated in 1993 and 1994, and will conclude in 1995. The following observations were made during the 1994 growing season.

***Tall fescue cultivars.*** The appearance of these cultivars seems superior to older tall fescue cultivars. First, there appears to be little color differences among these tall fescues with the overall color being very acceptable. 'Twilight' appears to be the darkest green. 'Bonsai' and 'Rebel Jr.' also display excellent color. Second, the leaf texture of these tall fescues is more coarse than Kentucky bluegrass. 'Bonsai' and 'Rebel Jr. ' appear, however, to have the finest leaf texture in this study. All of these cultivars appear to have a finer texture than Ky. 31. Finally, all the cultivars have produced a dense turf capable of out-competing weeds.

All cultivars survived the record cold temperatures with snow cover during the winter of 1993-94.

***Kentucky bluegrass cultivars.*** The aesthetic attributes of the Kentucky bluegrasses were also considered. 'Washington' appeared to have the earliest spring greenup, while 'Park' and 'BA73-366' appeared to have the slowest spring greenup. Color during the growing season was also a consideration. The darkest green cultivar in the trial was 'Midnight'. 'Washington also produced a dark green turf. 'Kenblue' appeared to be the lightest green. Finally, 'Washington' appeared to have the highest density, and 'Park' and 'Kenblue' had appeared to b the least dense types. As the growing season progressed, 'Midnight' appeared to thin.

***Poa supina.*** Initially, *Poa supina* grew aggressively and formed a dense turf. However, the color (a light yellow-green) and excessive thatch development are disadvantages to its use. In addition, turf thinning caused by sod webworm during 1994 was a problem that was followed by weed invasion.

***Sheep and hard fescues.*** Both the sheep and hard fescues produced relatively weed-free turf of acceptable density and good color.

***Alkaligrass.*** The alkaligrass had poor density, and it was difficult at times to find any present in the plots. There is speculation that for alkaligrass to thrive, there needs to be high concentrations of salt in the soil. The lack of density may, at least in part, be explained by the lack of salt present in the Garden's soils. The poor density allowed weed and grass invasion. The color of alkaligrass was a milky-green.

***Buffalograss.*** The buffalograss had low density, slow spring greenup, and was heavily invaded by weeds. Its color was acceptable when actively growing. During flowering, the male inflorescences seen above the turf's canopy provided visual interest.

This trial is scheduled to continue one more growing season. In the *1995 Illinois Turfgrass Research Report*, data from all three years of the study and recommendations for the North Shore will be presented.

# Observations of Low-Maintenance Grasses and Legumes Used for Erosion Control in a Woody Plant Nursery

*Tom Voigt and Connor Shaw*

In Illinois, nursery crops are commonly grown using a clean cultivated tillage system. Many nurserymen produce landscape plants in a clean cultivation system due to the perception of higher quality and customer preference. Clean tillage, however, can lead to soil erosion; the annual average loss of soildue to erosion in Illinois is 6.7 tons per acre (Neely and Heister, 1987). This is approximately 2.5 to 6 times greater than the natural soil erosion rate, an increase that can be attributed to human activities (Neely and Heister, 1987).

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| **Research Protocol:** | **Observations of Low-Maintenance Grasses and Legumes Used for Erosion Control in a Woody Plant Nursery** |
| **Location:** | Possibility Place Nursery, Monee, IL |
| **Site/ Establishment:** | soil types - Frankfort silty clay loam (poor soil), Brice silty clay loam (good soil); plot placement - between rows of nursery stock; plot size - 5ft x 6 ft. |
| **1990 Planting Species/Rates:** | buffalograss - 55 lbs PLS/A, Scaldis hard fescue - 176 lbs/A, sheep fescue - 176 lbs/A, redtop - 44 lbs/A, colonial bent - 44 lbs/A. |
| **1992 Planting Species/Rates:** | redtop + timothy+Dutch white clover - 5+5+2 lbs/A, Dutch white clover+birds foot trefoil - 5 + 5 lbs/A, Dutch white clover - 5 lbs/A |
| **Experimental Design:** | RCB; 3 replications. |

Although the majority of this loss is not associated with woody plant nurseries, any reduction in erosion, even a small quantity, is important. In addition to erosion, clean cultivated crop production requires the extensive use of herbicides and/or cross clean cultivation. Many of the herbicides used in nursery crop and landscape maintenance plantings have a tendency to run-off the application site via surface water.

One method of controlling erosion and surface runoff in cropping systems that use clean cultivation is with a cover of vegetation (Illinois Agronomy Handbook, 1984). Using low-cost, low-maintenance ground cover plantings between crop rows in nurseries is a conservation practice that also provides several other benefits to growers. Ground covers can improve soil tilth, moderate soil temperatures, and can dry wet soils when ground covers with high water demands are planted (Childers, 1978).

There are a number of demands placed on an appropriate ground cover crop. Kuhns (1989) indicates that crops should establish rapidly, be dense enough to discourage weed competition, have a slow vertical growth and spread, tolerate poor soils, require low-to-moderate fertility, tolerate traffic, and not interfere or limit the growth of crops. Added to these characteristics is a desire for a cover crop to be low and/or slow growing to reduce the need for mowing.

This demonstration was installed at Possibility Place Nursery in Monee, Illinois, to evaluate several grasses and legumes as potential erosion and runoff controls. Since its origination, Possibility Place Nursery has practiced sound soil management by using contour plantings when possible and by planting grasses between the rows of nursery crops to serve as erosion and runoff controls. Another unusual feature of this nursery is the plant material grown here. Possibility Place grows native woody plants. Most of these are propagated by locally collected seed, in fiber bags buried in the soil and watered and fertilized using drip irrigation. This bag culture speeds harvest and the drip irrigation supplies necessary water and minerals for growing plants. Grasses used for erosion control included Kentucky bluegrass and perennial ryegrass which required frequent mowing to stay at a desire height and were often invaded by perennial weeds.

This demonstration was initiated to evaluate several different grasses and legumes with several objectives in mind:

- the plants had to germinate quickly and cover the ground to control erosion;
- the plants should have slow vertical extension rate to limit mowing;
- the seeded grasses and/or legumes should be inexpensive to purchase;
- the seeded grasses and/or legumes should be competitive enough to restrict weed invasion;
- these plants should be controllable with commonly used nursery herbicides; and
- the plants should be aesthetically pleasing to nursery visitors.

The plots were established in the fall of 1990 and 1992 on 2 different type soils, a Frankfort silty clay loam (poor soil) and a Brice silty clay loam (good soil). All plant species were established at both sites.

The plots were evaluted in 1994. Compared with previously used vegetation, plants in this study had a slower growth rate so mowing frequency was reduced. All plantings, other than buffalograss, germinated and covered the ground quickly enough to serve as erosion controls. The combination planting of redtop, timothy, and Dutch white clover proved to be the best overall planting due to low initial cost, erosion control, and appearance. Because soil moisture was high near the fiber bags, all plants tended to invade into woody plant rows. Sheep fescue produced a high quality, attractive ground cover, but the seed was expensive. It tended to invade the woody plant planting bags, and was difficult to control with commonly used nursery herbicides. There appeared to be no discernible loss of above ground growth of the any landscape plants due to the different ground coverings. With the exception of buffalograss, all species and combinations reduced weed invasion when compared with previously used ground covers.

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# *ANNUAL AND PERENNIAL GRASS CONTROL RESEARCH AT THE UNIVERSITY OF ILLINOIS*

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

## Preemergence Crabgrass Control

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

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| **Research Protocol:** | **Preemergence Crabgrass Control Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Turf:** | Kentucky bluegrass. |
| **Application of Treatments:** | date applied - all treatments on April 22, 1994, except AGR40500 (April 29, 1994);<br>2nd applications of Team, Pendimethalin and Dimension made on June 17, 1994;<br>liquid herbicides - applied with a $CO_2$ backpack sprayer;<br>spray volume - 40 gpa;<br>granular herbicides - broadcast by hand. |
| **Turf Maintenance:** | mowing height - $1^7/_8$ inches;<br>pesticides - Trimec on April 27 and May 10 for postemergence broadleaf weed control;<br>irrigation - as needed to encourage crabgrass growth;<br>fertilization - none . |
| **Experimental Design:** | RCB;<br>3 replications. |

Most turfgrass managers prefer to control crabgrass with preemergence herbicides. These herbicides are applied prior to weed germination in the spring. In central Illinois germination begins mid-April to mid-May. To insure season long control a second application of preemergence herbicide is often needed. There are a number of preemergence herbicides for control of crabgrass on the market today. Periodically, new herbicides or new turf formulations of herbicides are developed. These herbicides need to be evaluated for efficacy and compared to the existing materials. The purpose of this research was to evaluate Team 2G (benefin + trifluralin, DowElanco) and Team 1.15% on fertilizer, Barricade 65WG (prodiamine, Sandoz Crop Protection) and prodiamine 0.22% with fertilizer; and PreM 60DG (pendimethalin, LESCO Inc.) and pendimethalin 1.21% with fertilizer. Also included in this evaluation were Dimension 1EC (dithiopyr, Monsanto Agriculture, Inc.); AGR40500 (undisclosed, AgrEvo); and Ronstar 2G (oxadiazon, Rhone-Poulenc). Table 1 contains herbicide rates. Each replication included an untreated plot.

The site used for the 1994 evaluation had many broadleaf weeds and bare spots. The previous year's crabgrass population was extremely high so large amounts of crabgrass seed was present. Average crabgrass cover in the untreated plots was 68.3% 89 days after treatment (DAT) and 86.7% 115 DAT. In general, the best crabgrass control was observed with Team, prodiamine and pendimethalin combined with fertilizer (Table 1). This reinforces the importance of fertilization in a comprehensive weed control program. No turf injury was observed with any of these treatments.

**Table 1.** The evaluation of herbicides applied 22 April 1994 for preemergence control of crabgrass in a Kentucky bluegrass turf.[1]

| Herbicide | Rate lbs ai/A | % Crabgrass Control[2] 7/20 89 DAT | 8/15 115 DAT |
|---|---|---|---|
| Team 1.15% with fertilizer | 1.5/1.5 | 65.8bc | 53.9a-f |
| Team 1.15% with fertilizer | 2.0 | 80.5b-d | 71.2e-g |
| Team 1.15% with fertilizer | 3.0 | 88.8cd | 78.9fg |
| Team 2G | 3.0 | 78.0b-d | 67.3e-g |
| prodiamine 0.22% with fertilizer | 0.5 | 78.0b-d | 57.7b-g |
| prodiamine 0.22% with fertilizer | 0.75 | 82.9cd | 67.3e-g |
| prodiamine 0.22% with fertilizer | 1.0 | 93.7d | 92.3g |
| Barricade 65WG | 0.32 | 75.6b-d | 48.1a-f |
| Barricade 65WG | 0.5 | 73.2b-d | 55.8a-f |
| Barricade 65WG | 0.65 | 73.2b-d | 57.7b-g |
| Barricade 65WG | 0.75 | 87.3cd | 65.4e-g |
| pendimethalin 1.21% with fertilizer | 1.5/1.5 | 68.3bc | 63.5d-g |
| pendimethalin 1.21% with fertilizer | 1.5 | 56.1ab | 42.3a-e |
| pendimethalin 1.21% with fertilizer | 3.0 | 90.2cd | 75.0e-g |
| Lesco PreM 60WP | 3.0 | 78.0b-d | 28.9a-d |
| Dimension 1EC | 0.38 | 68.3bc | 42.3a-e |
| Dimension 1EC | 0.5 | 78.0b-d | 67.3e-g |
| Dimension 1EC | 0.25/0.125 | 73.2b-d | 51.9a-f |
| Dimension 0.086% with fertilizer | 0.19 | 78.0b-d | 61.6c-g |
| AGR40500 | 1.5 | 34.9a | 25.0ab |
| AGR40500 | 2.0 | 56.1ab | 21.2a |
| Ronstar 2G | 3.0 | 56.1ab | 27.0a-c |

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

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

# Postemergence Crabgrass Control

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

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| **Research Protocol:** | **Postemergence Crabgrass Control Evaluation** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL; early trial - heavy clay soil; late trial - silt loam soil. |
| **Turf:** | Kentucky bluegrass. |
| **Application of Treatments:** | date applied - July 1, 1994, treatments applied at the 1-3 leaf stage of weed growth, July 8, 1994, all treatments applied at the 1-2 tiller stage of weed growth and the 3-5 tiller stage of growth; liquid herbicides - applied with a $CO_2$ backpack sprayer; spray volume - 40 gpa. |
| **Plot Maintenance:** | mowing height - 1.5 inches; pesticides - no additional pesticides; irrigation - as needed to stimulate crabgrass growth; fertilization - none. |
| **Experimental Design:** | RCB; 3 replications. |

Postemergence crabgrass control herbicides are needed if preemergence herbicides are not applied, fail to control crabgrass throughout the season, or are applied after some weed germination has occurred. In the past, organic arsenicals were the primary herbicides used for postemergence crabgrass control. More recently, fenoxaprop (Acclaim, AgrEvo) is used on fine quality turf postemergence crabgrass control. Acclaim is generally thought to be less phytotoxic and more efficacious with a single application than the organic arsenicals. The purpose of this trial was to evaluate early, mid and late applications of HOE-360 EW (fenoxaprop, AgrEvo) applied alone and with PreM (pendimethalin, LESCO, Inc.) and early applications of AGR 40500 (undisclosed, AgrEvo). Also evaluated were early treatments of Dimension 1EC and granular with fertilizer (dithiopyr, Monsanto) and early, mid and late treatments of Acclaim, (fenoxaprop, AgrEvo). A single PreM treatment was included for comparison with early postemergence applications. Tables 2, 3 and 4 list herbicide rates and formulations. Herbicide applications were made at 3 stages of crabgrass growth. Early postemergence applications (1-3 leaf stage of crabgrass growth) were made to an improved Kentucky bluegrass turf grown on heavy clay soil. Mid and late applications (1-2 tiller and 3-5 tiller stage of growth respectively) were made to a Kentucky bluegrass turf grown on silt loam soil.

***Early postemergence crabgrass control.*** All treatments controlled crabgrass when compared to the untreated plot. Twenty-one days after treatment most postemergence herbicides provided excellent control (Table 2). At 36 DAT control was still good to excellent. Dimension with fertilizer provided better control at 36 DAT than at 21 DAT. LESCO PreM provided about 33% crabgrass control indicating that some crabgrass germinated following treatment application. Crabgrass populations in the untreated plots 21 and 36 DAT respectively were rep 1, 10 and 10%; rep 2, 12 and 15%; and rep 3, 12 and 20%.

***Mid postemergence crabgrass control.*** All treatments controlled crabgrass when compared to the untreated plot. No significant difference in control was observed among treatments at 14 or 28 DAT (Table 3). Crabgrass populations in the untreated plots 14 and 28 DAT respectively were rep 1, 20 and 35%; rep 2, 20 and 25%; and rep 3, 20 and 20%.

**Table 2.** The evaluation of herbicides for postemergence control of crabgrass applied on 1 July at the 1 - 3 leaf stage of crabgrass growth.[1]

| | | % Crabgrass Control[2] | |
|---|---|---|---|
| | Rate | 7/22 | 8/05 |
| Herbicides | lb ai/A | 21 DAT | 36 DAT |
| Acclaim 1EC | 0.08 | 91.2bc | 95.6bc |
| Acclaim 1EC | 0.12 | 97.1bc | 97.8bc |
| AGR40500 | 1.5 | 100.0c | 97.8bc |
| AGR40500 | 2.0 | 100.0c | 97.8bc |
| AGR40500 | 3.0 | 100.0c | 93.3bc |
| AGR40500 | 4.0 | 100.0c | 100.0c |
| Dimension 1EC | 0.5 | 94.1bc | 77.8b |
| Dimension with fertilizer | 0.25 | 82.3b | 95.6bc |
| HOE 360EW +PreM | 0.04 + 2.0 | 97.1bc | 95.6bc |
| HOE 360EW | 0.04 | 97.1bc | 86.7bc |
| HOE 360EW | 0.06 | 97.1bc | 100.0c |
| Lesco PreM | 1.5 | 32.2a | 33.3a |

**Table 3.** The evaluation of herbicides for postemergence control of crabgrass applied on 8 July at the 1 - 2 tiller stage of crabgrass growth.[1]

| | | % Crabgrass Control[2] | |
|---|---|---|---|
| | Rate | 7/22[ns] | 8/05[ns] |
| Herbicides | lb ai/A | 14 DAT | 28 DAT |
| Acclaim 1EC | 0.18 | 88.3 | 97.5 |
| HOE 360 EW | 0.06 | 83.3 | 96.3 |
| HOE 360 EW | 0.09 | 85.0 | 96.3 |
| HOE 360 EW | 0.125 | 96.7 | 98.8 |

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

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

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

***Late postemergence crabgrass control.*** All treatments controlled crabgrass when compared to the untreated plot. No significant difference in control was observed among treatments at 14 or 28 DAT (Table 4). Crabgrass populations in the untreated plots 14 and 28 DAT respectively were rep 1, 95 and 95%; rep 2, 85 and 95%; and rep 3, 85 and 95%. Both mid and late postemergence trials had such a high infestation of crabgrass that it was impossible to determine if turf injury occurred.

**Table 4.** The evaluation of herbicides for postemergence control of crabgrass applied on 8 July at the 3 - 5 tiller stage of crabgrass growth.[1]

| | | % Crabgrass Control[2] | |
|---|---|---|---|
| | Rate | 7/22[ns] | 8/05[ns] |
| Herbicides | lb ai/A | 14 DAT | 28 DAT |
| Acclaim 1EC | 0.25 | 99.2 | 97.5 |
| HOE 360 EW | 0.09 | 94.7 | 95.8 |
| HOE 360 EW | 0.125 | 99.6 | 98.9 |
| HOE 360 EW | 0.18 | 99.6 | 99.3 |

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

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

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

# *BROADLEAF WEED CONTROL RESEARCH AT THE UNIVERSITY OF ILLINOIS*

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

## Preemergence Broadleaf Weed Control

*J.E. Haley and D.J. Wehner*

| | |
|---|---|
| **Research Protocol:** | **Preemergence Broadleaf Weed Control** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Turf:** | Kentucky bluegrass. |
| **Application of Treatments:** | date applied - April 4,1994; postemergence treatment applied May 20, 1994; liquid herbicides - applied with a $CO_2$ backpack sprayer; spray volume - 40 gpa. |
| **Plot Maintenance:** | mowing height - 2.5 inches; pesticides - no additional herbicides were applied; irrigation - irrigated only during severe moisture stress and dormancy; fertilization - none. |
| **Experimental Design:** | RCB; 3 replications. |

Traditionally, postemergence herbicides are used to control broadleaf weeds in turf. Some herbicides that prevent crabgrass germination will also prevent select broadleaf weeds such as yellow wood sorrel (*Oxalis stricta*), prostrate spurge (*Euphorbia humistrata*), and chickweed (*Cerastium vulgate* and *Stellar media*). However, with the development of preemergence herbicides that control a wider spectrum of weeds, many turf managers have, in recent years, turned to preemergence herbicides for broadleaf weed control. Gallery (isoxaben, DowElanco) is labeled to control over 40 broadleaf weed and annual grass species with preemergence applications to cool and warm season turfgrass. In this evaluation, two formulations of Gallery are examined, a dry flowable and a granular mixed with fertilizer. The dry flowable formulation is applied alone and in a tank mix with the postemergence broadleaf herbicide Confront (triclopry and clopyralid, DowElanco).

The most common weeds found on the test sites were dandelion (*Taraxacum officinale*) and white clover (*Trifolium repens*). Existing weeds were not killed prior to herbicide treatment. Because weeds were already present, applications of Gallery alone did not provide good weed control (Table 1). Gallery does not offer any postemergence control of broadleaf weeds. In most cases, April applications of Gallery and Confront combined provided the same control as May applications of Confront alone. The exception to this was dandelion control 109 days following Gallery plus Confront application and 63 days following a single Confront application.

**Table 1.** The evaluation of Gallery and Confront applications made to Kentucky bluegrass in the spring of 1994.[1]

| Herbicide | Rate lbs ai/A | % Control[2] Dandelion 67 DAT | Dandelion 109 DAT | Clover 67 DAT[ns] | Clover 109 DAT |
|---|---|---|---|---|---|
| Gallery on fertilizer 0.38G | 0.75 | 22.2a | 23.1a | 59.9 | 61.4a |
| Gallery 75DF | 0.75 | 22.2a | 25.2a | 69.9 | 68.5a |
| Gallery 75DF + Confront 3SL | 0.75 + 0.75 | 70.4b | 37.7ab | 100.0 | 90.0b |
| Gallery 75DF + Confront 3SL | 0.5 + 0.75 | 63.0ab | 47.0b | 100.0 | 100.0b |
| Confront 3SL[3] | 0.75 | 96.3b | 100.0c | 100.0 | 100.0b |

## Postemergence Broadleaf Weed Control

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

| | |
|---|---|
| **Research Protocol:** | **Postemergence Broadleaf Weed Control** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Turf:** | Kentucky bluegrass. |
| **Application of Treatments:** | date applied - May 20, 1994;<br>liquid herbicides - applied with a $CO_2$ backpack sprayer<br>spray volume - 40 gpa;<br>granular materials - applied by hand. |
| **Plot Maintenance:** | mowing height - 2.5 inches;<br>pesticides - no additional pesticides;<br>irrigation - irrigated only during severe moisture stress and dormancy;<br>fertilization - none. |
| **Experimental Design:** | RCB;<br>3 replications. |

Many of the available postemergence herbicides will kill a variety of broadleaf weeds. These herbicides are often a combination of several active ingredients and are found in a variety of formulations. The trend in postemergence broadleaf herbicides has been toward development of safer formulations. Many of these are granular formulations in combination with fertilizers. The purpose of this research was to evaluate several postemergence broadleaf weed control herbicides.

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

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

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

[3] Confront application was made May 20, 1994.

Herbicides included in this evaluation were Confront, liquid formulation and a granular formulation combined with fertilizer (triclopry and clopyralid, DowElanco), Turflon Ester 4EC (tricloypry, DowElanco), plus 2,4-D and Trimec Classic (2,4-D, MCPP and dicamba, P.B.I. Gordon)).

Broadleaf weeds found at the site included dandelion (*Taraxacum officinale*) and white clover (*Trifolium repens*). White clover control was good to excellent on all evaluation dates (Table 2). Turf injury was observed 13 days after treatment. Although not statistically significant, some herbicides appeared to temporarily cause a slight yellowing of the turf (Table 2). Dandelion control was good to excellent with all herbicides 13 and 47 days after application (Table 3). The lower rate of Confront did not control dandelions as well as the other herbicides and rates at 74 days after treatment.

**Table 2.** The evaluation of herbicides applied May 20 for postemergence control of white clover.[1]

| | | Clover Control[2] | | | Turf Injury[3ns] |
|---|---|---|---|---|---|
| Herbicide | Rate lb ai/A | 6/02 13 DAT | 7/06 47 DAT | 8/09 74 DAT | 6/02 13 DAT |
| Confront 3SL | 0.38 | 3.0ab | 1.0a | 1.0a | 7.3 |
| Confront 3SL | 0.75 | 2.7ab | 1.0a | 1.0a | 9.0 |
| Confront on fertilizer .47G | 175 lb cf/A | 3.3ab | 1.0a | 1.0a | 9.0 |
| Trimec Classic | 3 pt cf/A | 3.7ab | 1.3a | 1.7ab | 7.0 |
| Turflon Ester + 2,4-D 4EC | 1.0 + 1.0 | 2.3a | 1.0a | 1.0a | 8.0 |
| Turflon Ester 4EC | 1.0 | 4.0b | 1.0a | 1.3ab | 7.3 |
| untreated | - | 9.0c | 9.0b | 9.0c | 9.0 |

**Table 3.** The evaluation of herbicides applied May 20 for postemergence control of dandelion.[1]

| | | Dandelion[2] | | |
|---|---|---|---|---|
| Herbicide | Rate lb ai/A | 6/02 13 DAT | 7/06 47 DAT | 8/09 74 DAT |
| Confront 3SL | 0.38 | 2.7a | 2.7b | 4.0b |
| Confront 3SL | 0.75 | 3.0a | 1.0a | 1.3a |
| Confront on fertilizer .47G | 175 lb cf/A | 3.0a | 2.0ab | 2.0a |
| Trimec Classic | 3 pt cf/A | 3.0a | 1.3a | 1.0a |
| Turflon Ester + 2,4-D 4EC | 1.0 + 1.0 | 2.7a | 1.0a | 1.3a |
| Turflon Ester 4EC | 1.0 | 3.0a | 2.0ab | 2.0a |
| untreated | - | 9.0b | 9.0c | 9.0c |

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

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

[3] Turf injury is evaluated on a scale of 1-9, where 9 = no visible injury and 1 = necrotic turf.

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

# *TURFGRASS NUTRIENT RESEARCH AT THE UNIVERSITY OF ILLINOIS*

## Nitrogen Utilization in Creeping Bentgrass

*Y. Kuo, D.J. Wehner and T.W. Fermanian*

Efficient approaches for screening nitrogen utilization efficiency (NUE) of turfgrasses are needed. Too much N can cause poor root and shoot growth, higher disease incidence such as smut and pythium, reduced carbohydrate reserves, result in poor tolerance to environmental stress, ground water pollution, etc. Nitrogen utilization efficiency defined as the amount dry matter produced per quantity of N in the plant. Nitrogen utilization efficiency evaluation usually starts by decreasing effectiveness of N fertilizer (low N) to stimulate greater utilization.

In this study, the NUE of fourteen cultivars of bentgrass were compared in an hydroponic solution culture. There were significant differences among cultivars in root, shoot, whole plant dry weight and NUE (Table 1). Differences in NUE among most cultivars were correlated to plant dry weight (Fig. 1). Non-creeping type cultivars have lower total dry weight and NUE than creeping type cultivars. On a whole plant dry weight basis, 'Regent' had the highest NUE while 'Allure' had the lowest NUE.

Four cultivars of creeping bentgrass selected from previous screening were grown under low (3 ppm) and high (50 ppm) levels of N in a flowing solution cultural systems. In general, nitrogen utilization efficiency decreased with increasing N levels (Table 2).

The high NUE cultivars grew well under the condition of nitrogen deficiency. Golf course managers may provide too much N for these cultivars. Solution systems can be used for an effective means of screening the NUE of creeping bentgrass cultivars. Further proof under field conditions is necessary.

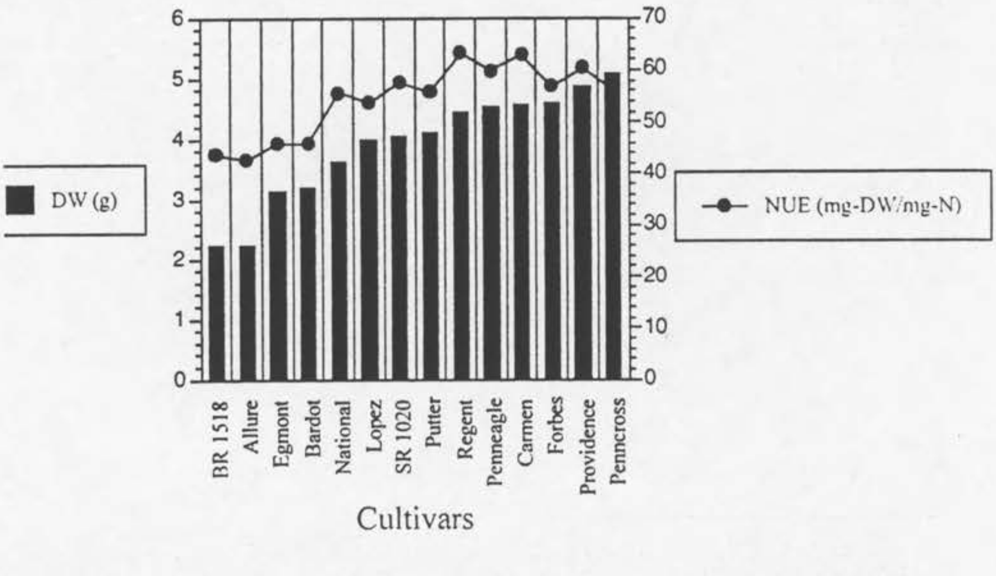



**Figure 1.** The relationship between whole plant dry weight (DW) and nitrogen utilization efficiency (NUE) of bentgrass cultivars grown under low levels of N (3 ppm).

**Table 1.** Mean dry weight (DW) and nitrogen utilization efficiency (NUE) of bentgrass cultivars grown under low (3ppm) levels of N.

| | Whole Plant[1] | | Root[1] | | Shoot[1] | |
|---|---|---|---|---|---|---|
| Cultivars | DW | NUE | DW | NUE | DW | NUE |
| BR1518 | 2.22a | 43.74a | 0.81ab | 69.35b-e | 1.34a | 35.96a |
| Allure | 2.21a | 42.74a | 0.73a | 57.32a | 1.48a | 37.98ab |
| Egmont | 3.13b | 45.90ab | 1.22d | 59.74ab | 1.91b | 40.31ab |
| Bardot | 3.20b | 45.89ab | 1.20d | 68.68a-e | 2.00b | 38.74ab |
| National | 3.62bc | 55.60cd | 0.83a-c | 60.08a-c | 2.79c | 54.62c-e |
| Lopez | 3.98cd | 53.78bc | 1.12b-d | 73.23de | 2.86c | 49.21bc |
| SR1020 | 4.05c-e | 57.54cd | 1.03a-d | 65.08a-e | 3.01cd | 55.43c-e |
| Putter | 4.11c-e | 55.79cd | 0.72a | 66.76a-e | 3.38d-f | 53.79c-e |
| Regent | 4.44def | 1.06b-d | 70.72b-e | 3.37d-f | 61.29de | 63.30d |
| Penneagle | 4.52de-g | 59.89cd | 1.04a-d | 71.72c-e | 3.48e-g | 57.21c-e |
| Carmen | 4.56de-g | 62.92cd | 1.15cd | 61.68a-d | 3.42e-g | 64.05e |
| Forbes | 4.60e-g | 56.86cd | 1.33d | 74.84e | 3.27de | 51.94cd |
| Providence | 4.88fg | 60.49cd | 1.15cd | 61.86a-d | 3.74fg | 60.23c-e |
| Penncross | 5.09g | 55.99cd | 1.31d | 67.34a-e | 3.78g | 53.09c-e |

**Table 2.** Mean whole plant dry weight (DW) and nitrogen utilization efficiency (NUE) of four creeping bentgrass cultivars grown under low (3 ppm) and high (50 ppm) levels of N.

| | | Whole plant[2] | | Root[2] | | Shoot[2] | |
|---|---|---|---|---|---|---|---|
| Cultivars | N level | DW | NUE | DW | NUE | DW | NUE |
| National | low | 3.28a | 38.92b | 0.89b | 48.83b | 2.39a | 36.40b |
| SR1020 | low | 3.51ab | 42.56cd | 0.90b | 49.66b | 2.61ab | 41.00cd |
| Penncross | low | 4.64a-c | 40.12bc | 1.41c | 49.16b | 3.23ab | 37.17bc |
| Putter | low | 5.18bc | 44.95d | 1.17b | 54.37b | 4.01bc | 42.90d |
| National | high | 7.42d | 20.57a | 0.65ab | 29.98a | 6.77d | 19.99a |
| SR1020 | high | 6.34cd | 21.18a | 0.67ab | 34.37a | 5.67d | 20.26a |
| Penncross | high | 9.67e | 20.50a | 0.57a | 31.60a | 8.57e | 19.57a |
| Putter | high | 5.81cd | 20.56a | 0.54a | 31.26a | 5.24cd | 19.82a |

[1] Values within a column followed by the same letter are not significantly different at the 5% level by Fisher's protected LSD.

[2] Values within a column followed by the same letter are not significantly different at the 5% level by Fisher's protected LSD.

# *TURFGRASS NUTRIENT RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY*

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

*K. L. Diesburg*

| | |
|---|---|
| **Research Protocol:** | **Effects of Nutrient Sources, Biostimulants, and Soil Modifiers on Zoysiagrass Turf Quality** |
| **Site:** | turf - Korean Common zoysiagrass;<br>soil - Hosmer silt clay loam, 3% slope, nutrient depleted;<br>plot size - 5'x 5'. |
| **Application of Treatments:** | date applied - July 11, August 16;<br>liquid materials - $CO_2$ backpack sprayer;<br>granular - materials - salt-shaker type;<br>spray volume - 150 gpa;<br>Terra-Sorb - slit-seeder at 0.5 inch. |
| **Turf Maintenance:** | mowing height -1.5 inches;<br>pesticides - Barricade preemergent in April, Trimec Plus in July;<br>irrigation - none. |
| **Experimental Design:** | RCB;<br>4 replications. |

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

The initial purpose for this experiment is to put many of these new products (Table 1) into the same management environment in order to determine their relative effects on turf quality. The long-term goal is to compare changes in soil properties after several years of treatment and correlate the soil data with the turfgrass quality data.

There were no significant differences among the effects of the Agrico Turf treatments, although the numerical ratings of the granular treatments were always greater.

Also, the numerical ratings of the solution treatments with AgroTain were greater than those without AgroTain.

No burning of zoysiagrass foliage by the solution treatments was observed at any time. This does not rule out the possibility of burn on the more tender leaves of cool-season grasses.

**Table 1.** Treatments applied to mature Korean Common turf 1994.

| Treatment | Supplier | Rate[1] lb/M |
|---|---|---|
| Nutrient | | |
| Agrico Turf granular | | 1 N |
| Agrico Turf solution | | 1 N |
| Agrico Turf + Agrotain 1.1% granular | | 1 N |
| Agrico Turf + Agrotain 1.1% solution | | 1 N |
| Agrico Turf + Agrotain 2.2% granular | | 1 N |
| Agrico Turf + Agrotain 2.2% solution | | 1 N |
| Urea (46-0-0) | | 1 N |
| Sulphur-Coated Urea (SCU 37-0-0) | | 1 N |
| Triple-Super-Phosphate (0-46-0) | | 1 P |
| Potassium Chloride (0-0-60) | | 1 K |
| Sprint (10% iron chelate) | Ciba | 0.2 Fe |
| SCU + Sprint | | 1 N + 0.2 Fe |
| Esmigran (micro.)(0.02% Fe) | Mallinkrodt | 4 mat (0.2 Fe) |
| SCU + Esmigran | | 1 N |
| Ferromec (15-0-0)(6% Fe) | PBI Gordon | 4 mat |
| (18-4-10) | Lebanon | 1 N |
| (10-2-6) animal by-product | Ringer | 1 N |
| IBDU (20-0-16) | Par-Ex | 3 N |
| Once (24-0-0) resin-coated urea | Grace-Sierra | 3 N |
| (28-0-0) formolene | Coron | 1 N |
| Nitroform (38-0-0) long UF | NorAm | 3 N |
| Nutralene (40-0-0) short UF | NorAm | 3 N |
| Milorganite (6-2-0) (processed sewage sludge) | Milwaukee Met. Sewerage Dist. | 3 N |
| Biostimulant | | |
| Bova Mura (5-0-0) (cow manure base) | PBI Gordon | 1 N |
| Bova Mura (5-0-0) (cow manure base) | PBI Gordon | 0.05 N |
| Sand-Aid sea plant meal | Emerald Isle | 10 material |
| Sand-Aid + Milorganite | | 10 mat.+3 N |
| Per4max + Urea | Floratine | 0.1875 mat.+1 N |
| Per4max + Renaissance + Urea | Floratine | 0.125+0.09 +1 N |
| Knife + Per4max + Rennaissance + Urea | | 0.09+0.13+0.09+1N |
| Soil Modifier | | |
| Maxiplex (humates) + Urea | Floratine | 0.75 mat. + 1 N |
| Maxiplex | Floratine | 0.75 mat. |
| Terra-Sorb + Milorganite polyacrylamide gel | Indust Srvcs Int. | 3 mat. + 3 N |

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

**Table 2.** Zoysia turf quality and color in response to nutrient sources, biostimulants, and soil amendments.[1]

| Treatment | Turf Quality Ratings[2] 8/11 | 9/10 | Avg |
|---|---|---|---|
| Applied once at 3 lb N | | | |
| Nitroform | 8.8 | 8.8 | 8.8 |
| Once | 8.3 | 8.5 | 8.4 |
| IBDU | 8.5 | 8.0 | 8.3 |
| Milorganite | 7.5 | 8.5 | 8.0 |
| Nutralene | 7.5 | 8.0 | 7.8 |
| Terrasorb + Milorganite | 6.8 | 8.0 | 7.4 |
| Ringer | 7.8 | 6.5 | 7.1 |
| Applied twice at 1 lb N | | | |
| SCU + Sprint (Fe) | 6.5 | 7.5 | 7.0 |
| Agr/Trf + Agrotain 1.1% granular | 5.8 | 8.0 | 6.9 |
| Agr/Trf granular | 5.5 | 8.3 | 6.9 |
| Agr/Trf + Agrotain 2.2% granular | 5.3 | 8.0 | 6.6 |
| Urea | 4.8 | 8.3 | 6.5 |
| Agr/Trf + Agrotain 1.1% solution | 5.5 | 7.3 | 6.4 |
| SCU | 5.3 | 7.5 | 6.4 |
| Ferromec | 6.5 | 5.8 | 6.1 |
| 18-4-10 Lebanon | 5.0 | 7.3 | 6.1 |
| SCU + Esmigran | 4.8 | 7.5 | 6.1 |
| Agr/Trf + Agrotain 2.2% solution | 5.0 | 7.0 | 6.0 |
| Coron | 5.3 | 6.5 | 5.9 |
| Agr/Trf solution | 4.5 | 7.3 | 5.9 |
| Bova Mura (1 N) | 4.5 | 5.5 | 5.0 |
| Triple-Superphosphate | 3.8 | 4.0 | 3.9 |
| Potassium Chloride | 3.3 | 3.8 | 3.5 |
| Esmigran | 2.8 | 4.3 | 3.5 |
| Sprint (Fe) | 3.0 | 3.0 | 3.0 |
| Biostimulants | | | |
| Per4max + Urea | 6.0 | 7.8 | 6.9 |
| Per4max + Renaissance + Urea | 5.5 | 6.5 | 6.0 |
| Maxiplex + Urea | 4.0 | 7.8 | 5.9 |
| Knife+Per4max+Renaissance+Urea | 4.5 | 7.0 | 5.8 |
| Maxiplex | 3.5 | 5.3 | 4.4 |
| Bova Mura | 2.8 | 3.0 | 2.9 |
| Soil Modifiers | | | |
| Sand-Aid + Milorganite | 5.0 | 7.3 | 6.1 |
| Sand-Aid | 2.5 | 4.8 | 3.6 |
| Nontreated Control | 3.0 | 4.3 | 3.6 |
| $LSD_{0.05}$ | 1.6 | 1.9 | 1.1 |

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

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

# *GROWTH RETARDANT RESEARCH AT THE UNIVERSITY OF ILLINOIS*

## Evaluation of Primo Applied in Tank Mixes with Other Herbicides

*J.E. Haley and T.W. Fermanian*

| | |
|---|---|
| **Research Protocol:** | **Evaluation of Primo Applied in Tank Mixes with Other Herbicides** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Turf:** | Kentucky bluegrass. |
| **Application of Treatments:** | date applied - May 20, 1994, all treatments; liquid herbicides - applied with a $CO_2$ backpack sprayer; spray volume - 40 gpa. |
| **Turf Maintenance:** | mowing height - 2 inches, mowed weekly, fresh weight taken for each plot; pesticides - no additional pesticides; irrigation -as needed to prevent wilt. |
| **Experimental Design:** | RCB; 3 replications. |

Mowing continues to use the greatest number of resources in a turf management program. Kentucky bluegrass turf, particularly in early spring, has a high mowing requirement. The use of plant growth regulators (PGRs) can help to slow down the vertical expansion of bluegrass turfs and minimize this mowing requirement. A new plant growth regulating material, Primo (trimexapac ethyl, Ciba Giegy Corporation), is being investigated for its ability to reduce vertical growth of Kentucky bluegrass. This research examined the use of Primo in tank mixes with other commonly used turf herbicides. Herbicides used in this evaluation included LESCO PreM 60WP (pendimethalin, LESCO, Inc.) and Barricade 65WG (prodiamine, Sandoz Crop Protection), both preemergence crabgrass control herbicides; Dimension 1EC (dithiopyr, Monsanto Agricultural Co.), a pre and postemergence crabgrass control herbicide; Acclaim 1EC (fenoxaprop, AgrEvo), a postemergence crabgrass control herbicide; and Confront 3SL (triclopyr and clopryalid, DowElanco), a postemergence broadleaf weed herbicide.

Data were recorded for turf color and injury (Table 1 and 2). Color evaluations were made on a scale of 1 to 9 with one equaling tan turf and 9 equaling the darkest possible turf. Injury evaluations were made on a scale of 1 to 9 with one equaling dead turf and 9 equaling no visible turf injury. Plots were also evaluated for fresh weight production (Table 3).

**Table 1.** The evaluation of the color of a Kentucky bluegrass turf treated with Primo applied in tank mixes with other herbicides.[1]

| | | Color[2] | | | | |
|---|---|---|---|---|---|---|
| Tank Mix | Rate lb ai/A | 6-01 12 DAT | 6-09 20 DAT | 6-17 28 DAT | 6-28 39 DAT | 7-08[ns] 49 DAT |
| Primo 1EC | 0.25 | 7.7b | 7.7b | 7.3bc | 6.7bc | 7.0 |
| Primo + PreM 60WP | 0.25 + 3.0 | 7.3b | 7.7b | 8.0c | 7.7c | 7.0 |
| Primo + Confront 3SL | 0.25 + 0.75 | 8.7b | 7.7b | 7.7bc | 6.7bc | 7.0 |
| Primo + Dimension 1EC | 0.25 + 0.5 | 7.7b | 8.0b | 7.3bc | 7.3bc | 7.0 |
| Primo + Barricade 65WG | 0.25 + 0.5 | 7.0ab | 7.7b | 7.0b | 6.3ab | 7.0 |
| Primo + Acclaim 1EC | 0.25 + 0.18 | 5.0a | 4.7a | 4.7a | 5.3a | 7.0 |
| Untreated check | -- | 8.3b | 7.7b | 7.0b | 7.7c | 7.0 |

**Table 2.** The evaluation of the injury to a Kentucky bluegrass turf treated with Primo applied in tank mixes with other herbicides.[1]

| | | Injury[3] | | | | |
|---|---|---|---|---|---|---|
| Tank Mix | Rate lb ai/A | 6-01 12 DAT | 6-09 20 DAT | 6-17 28 DAT | 6-28 39 DAT | 7-08ns 49 DAT |
| Primo 1EC | 0.25 | 7.7b | 7.0b | 7.0b | 7.3bc | 9.0 |
| Primo + PreM 60WP | 0.25 + 3.0 | 7.7b | 7.3b | 7.0b | 8.0c | 9.0 |
| Primo + Confront 3SL | 0.25 + 0.75 | 8.0b | 7.0b | 6.7b | 7.0b | 8.3 |
| Primo + Dimension 1EC | 0.25 + 0.5 | 7.7b | 6.3b | 7.0b | 7.7bc | 9.0 |
| Primo + Barricade 65WG | 0.25 + 0.5 | 8.0b | 6.7b | 6.3b | 7.3bc | 9.0 |
| Primo + Acclaim 1EC | 0.25 + 0.18 | 5.0a | 4.0a | 4.7a | 5.0a | 9.0 |
| Untreated check | -- | 9.0c | 9.0c | 9.0c | 9.0d | 9.0 |

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

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

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

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

**Table 3.** The evaluation of the injury to a Kentucky bluegrass turf treated with Primo applied in tank mixes with other herbicides.[1]

| Tank Mix | Rate lb ai/A | Weight[2] 5-26 6 DAT | 6-01 12 DAT | 6-08 19 DAT | 6-15 26 DAT |
|---|---|---|---|---|---|
| Primo 1EC | 0.25 | 44.6ab | 18.2ab | 16.3a | 10.0a |
| Primo + PreM 60WP | 0.25 + 3.0 | 45.0ab | 23.4b | 23.8a | 11.1a |
| Primo + Confront 3SL | 0.25 + 0.75 | 58.5b | 19.5ab | 17.3a | 13.4a |
| Primo + Dimension 1EC | 0.25 + 0.5 | 46.9ab | 19.7ab | 17.8a | 9.7a |
| Primo + Barricade 65WG | 0.25 + 0.5 | 41.6ab | 15.1ab | 14.3a | 8.9a |
| Primo + Acclaim 1EC | 0.25 + 0.18 | 29.9a | 7.9a | 12.6a | 10.8a |
| Untreated check | -- | 93.5c | 56.4c | 75.0b | 73.8b |

*(continued)*

**Table 3.** The evaluation of the injury to a Kentucky bluegrass turf treated with Primo applied in tank mixes with other herbicides.[1] *(continued)*

| Tank Mix | Rate lb ai/A | Weight[2] 6-22 33 DAT | 6-29 40 DAT | 7-06[ns] 47 DAT | 7-18ns 59 DAT |
|---|---|---|---|---|---|
| Primo 1EC | 0.25 | 11.6a | 36.9a | 53.2 | 45.5 |
| Primo + PreM 60WP | 0.25 + 3.0 | 10.5a | 33.1a | 45.7 | 34.3 |
| Primo + Confront 3SL | 0.25 + 0.75 | 13.9a | 33.3a | 52.0 | 52.0 |
| Primo + Dimension 1EC | 0.25 + 0.5 | 10.8a | 40.5a | 50.4 | 44.1 |
| Primo + Barricade 65WG | 0.25 + 0.5 | 8.8a | 28.2a | 42.5 | 38.0 |
| Primo + Acclaim 1EC | 0.25 + 0.18 | 12.6a | 40.2a | 58.1 | 56.1 |
| Untreated check | -- | 44.8b | 55.4b | 51.6 | 45.4 |

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

[2]Weight refers to grams fresh weight per 14.5 sq ft.

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

# Storage Carbohydrate Content of Creeping Bentgrass Receiving Multiple Applications of Growth Retardants

*Sangwook Han and T. W. Fermanian*

The total nonstructural carbohydrate (TNC) content of plant tissue is an indirect estimate of the reserve energy available to plants. Carbohydrate reserves are essential for the survival and tissue production when the respiration rate exceeds photosynthetic activity. The total nonstructural carbohydrate content of plant tissues are often used as an indicator of the physiological stress status of a turfgrass. Turfgrass growth retardants (TGR) may affect accumulation and distribution of nonstructural carbohydrates among plant tissue. Consequently, this change could affect positively or negatively turf tolerance to environmental stress or its recuperative potential from damage or injury.

| | |
|---|---|
| **Research Protocol:** | **Storage Carbohydrate Flux of Turfs Receiving Sequential Applications of Growth Retardants** |
| **Location:** | Greenhouse of Plant Science Lab; Urbana, IL |
| **Turf :** | "Penncross" Creeping bentgrass. |
| **Treatments:** | growth regulator - Primo (0.25 lb ai/A), Cutless (0.5 lb ai/A), Scott's TGR (0.25 lb ai/A). |
| **Application intervals:** | single application, every 2 weeks ; every 4 week applications during first 2 months. |
| **Turf Maintenance:** | mowing height - 1.0 inch, mowed every other day; fertilization - 16.7 lb N/A/week. |
| **Tissue sample:** | root and shoot (every 2 weeks for 4 months). |
| **Measurement:** | storage carbohydrates and root dry weight. |
| **Experimental Design:** | factorial arrangement in a RCB; 5 reps. |

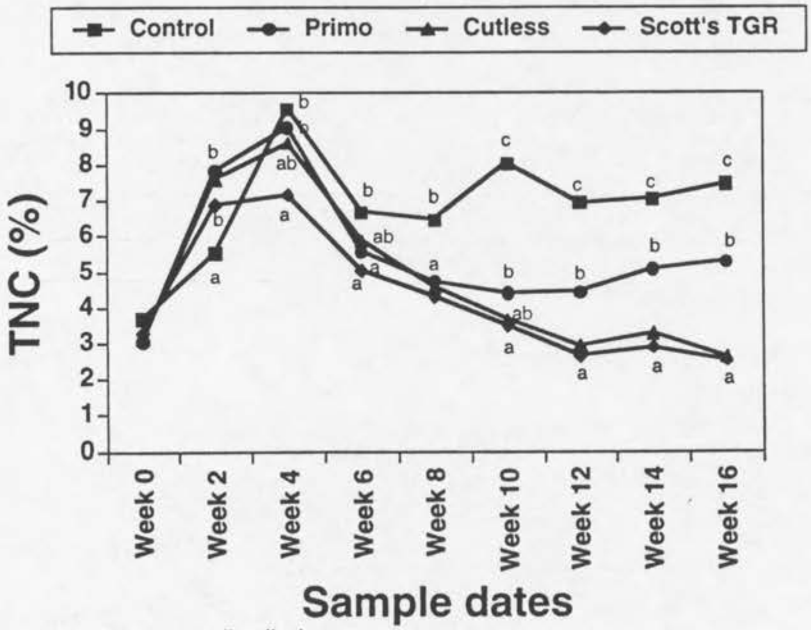
Since TGR applications are becoming more common place in fine turf management, detailed information on the influence of TGRs is needed to utilize TGRs correctly and efficiently. A single application of TGRs will suppress turf growth for a short period, generally for 4 to 10 weeks. Thus, the determination of carbohydrate status of turfs receiving multiple applications of growth retardants could be useful for long term programming of the use of TGRs.

Objectives of this study were (1) To determine the long-term storage carbohydrate dynamics of turfs receiving multiple application of turfgrass growth retardants (2) To determine TGR effects on the storage carbohydrate status at different application intervals and total rates.

Primo, Cutless and Scott's TGR significantly increased total nonstructural carbohydrates (TNC) of creeping bentgrass at 2 weeks after their application but TNC began to decreace at 4 WAT compared to the control (Figure 1). However, there was no clear difference among the different application intervals (Figure 2). For root tissue, creeping bentgrass treated with Primo had higher quantities of total nonstructural carbohydrate for all sampling dates as compared to the control, Cutless, or Scott's TGR treated turf (Figure 3). There were no differences in root TNC content among different application intervals (Figure 4). Creeping bentgrass treated with Primo, Cutless, or Scott's TGR also showed more root dry weight than the control (Figure 5).

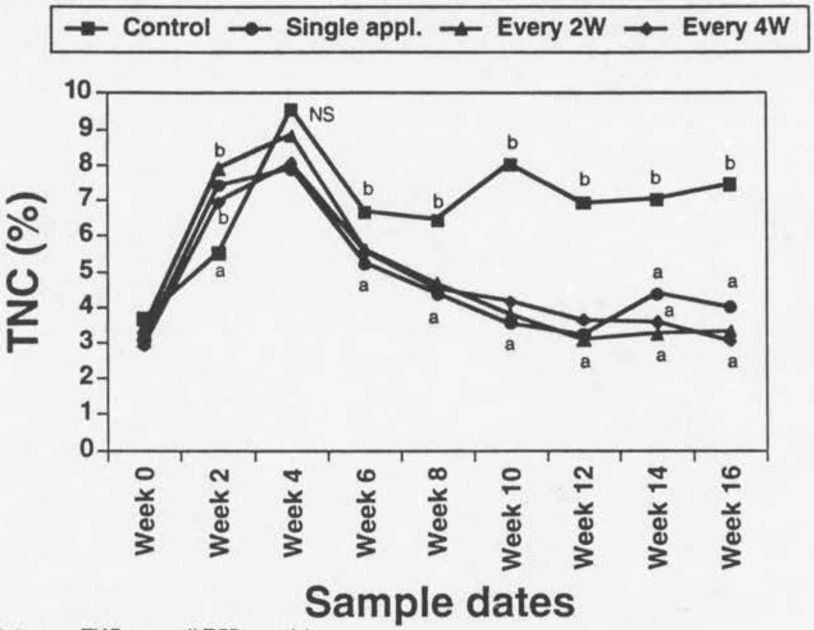
Turfs receiving growth regulators had unacceptable visual discoloration during the hot summer in the greenhouse, which indicates that the inappropriate use of growth regulators during stressful periods may cause unexpected damage. These findings are the preliminary results of continuing studies and should not be translated as final conclusions of effects of TGRs on storage carbohydrate. This study will be repeated in both the greenhouse and field.

**TGR effects on total nonstructural carbohydrate (TNC) of creeping bentgrass above ground tissue* (Figure 1)**



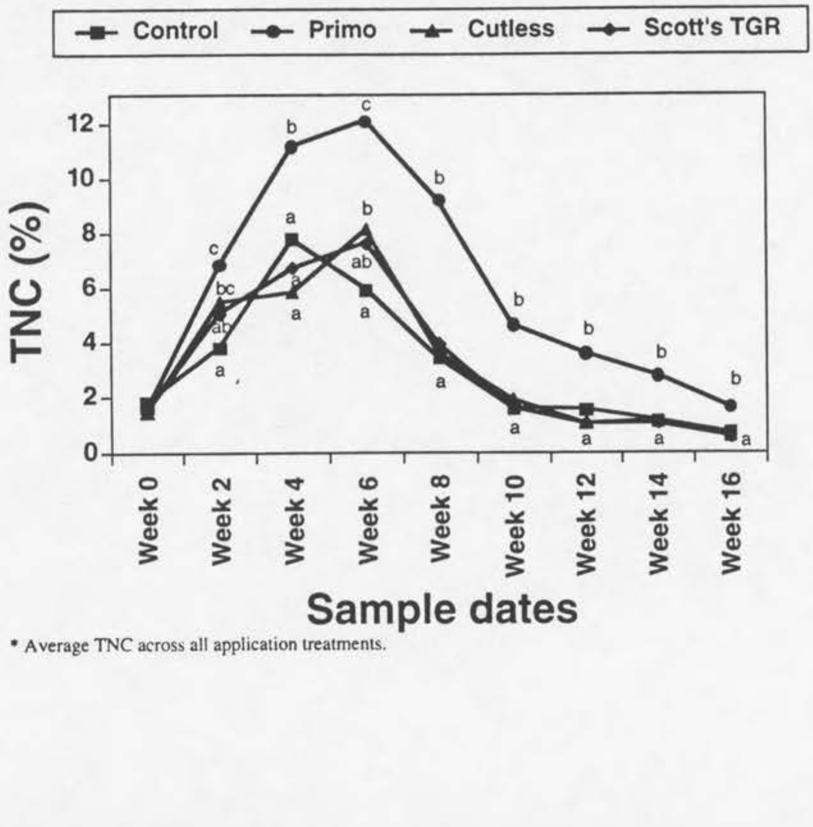

* Average TNC across all application treatments.

## Effects of application intervals on TNC of creeping bentgrass above ground tissue* (Figure 2)



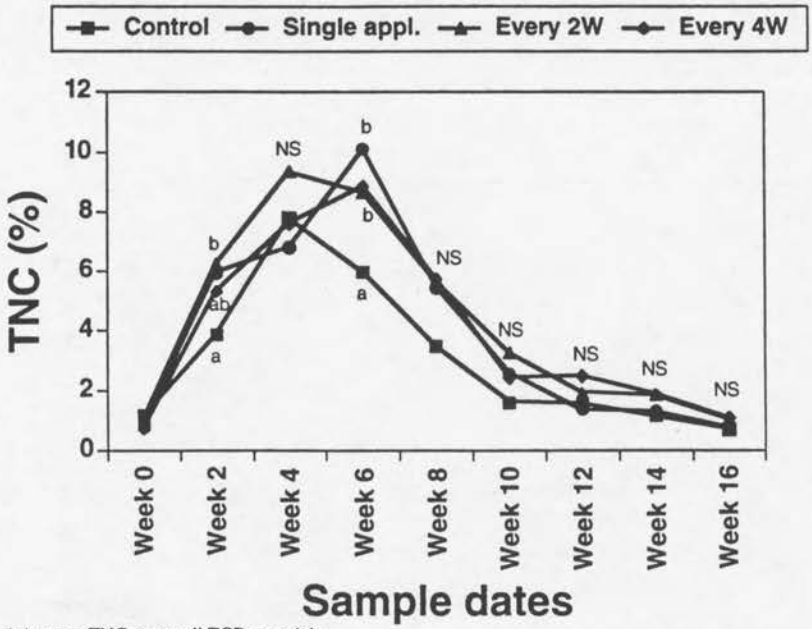

* Average TNC across all TGR materials.

## TGR effects on total nonstructural carbohydrate (TNC) of creeping bentgrass roots* (Figure 3)



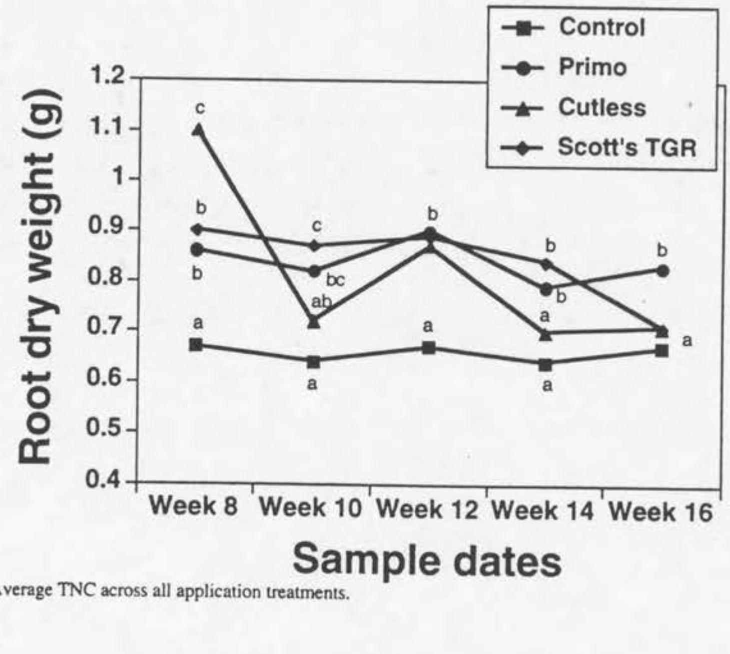

* Average TNC across all application treatments.

## Effects of application intervals on TNC of creeping bentgrass roots* (Figure 4)




* Average TNC across all TGR materials.

## Creeping bentgrass root response to the application of growth retardants* (Figure 5)




* Average TNC across all application treatments.

# *GROWTH RETARDANT RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY*

## Evaluation of Growth Regulator Combinations on Kentucky Bluegrass Turf and Efficacy of ProGibb in Negating the Effects of Primo

*Dr. Kenneth L. Diesburg*

| | |
|---|---|
| **Research Protocol:** | **Growth Regulator Evaluation** |
| **Location:** | Horticulture Research Center, Carbondale, IL |
| **Site:** | soil - Hosmer clay loam, pH 6.5; turf - three-year old 'Huntsville' Kentucky bluegrass; irrigation to - prevent moisture stress; fertilization - 4 lb N/M/yr, SCU and Nitroform; pesticides - Banner preemergent applied, April 14, Trimec postemergent applied, March 10. |
| **Methods:** | liquid materials - $CO_2$ backpack sprayer with 5' boom; spray volume - 150 gal/A water; ProGibb applied to half plots immediately after application of whole plot treatments; fresh clipping weights recorded immediately following mowing of plots; mowing - individual plot clippings were of a single pass of a rotary mower at 2 1/2" clipping height; alleys - mowed between ranges of plots at 2" clipping height to avoid error in mowing between adjacent plots. |
| **Experimental Design:** | RCB; 3 replications. |

Effects of Primo and Progibb were evident within five days after treatment. Progibb overcame the effects of Primo (2x and 3x trt.) too much. Leaf elongation rate was excessive beyond that of the control. From five to ten days after treatment turfgrass quality, though not lower than the UTC, was of a different quality (Table 1). The leaves were lighter green and more lush (thinner cell walls, apparently trt.). At 17 days after treatment, turfgrass quality of Progibb-treated plots was lower than that of the UTC. Density was the primary criterion that had diminished. Evidence of this is seen in the clippings being less than that of the UTC. Progibb effects ended within three weeks after treatment, but Primo effects lasted to six weeks after treatment. The Primo effect was not visible at four weeks after treatment, as vigorous leaf elongation had resumed. But canopy height and clipping weight were less than that of the UTC (Tables 2 and 3). Turfgrass quality of the UTC decreased by eight weeks after treatment because of brown patch pressure. Plots treated with Primo, with and without Progibb, had higher turfgrass quality than the UTC during that time.

Application of Florel was more effective than Primo, but turf quality was reduced.

**Table 1.** Turfgrass quality ratings[1] of Huntsville Kentucky bluegrass in response to growth regulators, 1994, Southern Illinois University.

| | Days After Treatment, 6/29 | | | | | |
|---|---|---|---|---|---|---|
| Treatment | 5 | 9 | 17 | 42 | 58 | Avg |
| UTC | 7.7 | 8.0 | 8.3 | 9.0 | 6.5 | 7.9 |
| Primo 0.75 oz mat/M | 7.3 | 7.7 | 7.3 | 9.0 | 8.2 | 7.9 |
| Primo 0.75 oz/M withCutless 1 lb ai/A | 8.3 | 8.0 | 6.3 | 8.4 | 8.1 | 7.8 |
| Primo 1.50 oz mat/M with Urea 0.75 lb N/M | 6.7 | 8.0 | 7.0 | 9.0 | 8.3 | 7.7 |
| Progibb 1/2 plot (Primo 1.50 oz mat/M with Urea 0.75 lb N/M trt.) | 8.0 | 8.0 | 6.3 | 8.7 | 8.3 | 7.9 |
| Cutless 1 lb ai/A | 7.0 | 8.3 | 7.7 | 8.3 | 7.3 | 7.7 |
| Primo 2.25 oz/M | 7.7 | 7.7 | 6.0 | 8.5 | 8.3 | 7.6 |
| Progibb 1/2 plot[2] (Primo 2.25 oz/M trt.) | 8.7 | 8.3 | 6.0 | 8.5 | 8.3 | 8.0 |
| EXP 31039A 2 lb ai/A | 7.7 | 7.3 | 7.3 | 7.8 | 7.5 | 7.5 |
| EXP 31039A 4 lb ai/A | 7.0 | 7.0 | 6.3 | 8.8 | 8.2 | 7.5 |
| Primo 1.50 oz mat/M | 6.3 | 7.3 | 6.3 | 8.8 | 8.2 | 7.4 |
| Progibb 1/2 plot (Primo 1.50 oz mat/M trt.) | 8.3 | 8.7 | 6.0 | 8.5 | 8.2 | 7.9 |
| Primo 2.25 oz mat/M | 6.7 | 7.3 | 6.7 | 9.0 | 6.8 | 7.3 |
| N 0.75 lb/M 1/2 plot (Primo 2.25 oz mat/M trt.) | 6.7 | 7.3 | 6.7 | 9.0 | 7.2 | 7.4 |
| Florel 4 lb ai/A | 7.0 | 7.7 | 6.3 | 8.2 | 7.5 | 7.3 |
| Primo 1.50 oz mat/M | 7.7 | 7.3 | 5.7 | 7.0 | 6.8 | 6.9 |
| Progibb 0.25 oz/M | | | | | | |
| Progibb 1/2 plot (Progibb 0.25 oz/M trt.) | 7.7 | 8.0 | 5.7 | 7.0 | 6.8 | 7.0 |
| Primo 0.75 oz/M with Paclobutrazol 0.375 lb ai/A | 6.3 | 7.3 | 6.0 | 7.7 | 6.3 | 6.7 |
| $LSD_{0.05}$ | 0.6 | 0.7 | 1.0 | 1.2 | 0.5 | 0.2 |

[1] Ratings based on a scale of 1-9, 9=best combination of color, texture and density

[2] Progibb applied to half the plot at 0.25 oz/M

**Table 2.** Canopy heights in centimeters of Huntsville Kentucky bluegrass in response to growth regulators 1994 Southern Illinois University.

| Treatment | Days After Treatment, 6/29: 5 | 9 | 17 | 42 | 58 | Avg |
|---|---|---|---|---|---|---|
| EXP31039A 4 lb ai/A | 7.8 | 6.7 | 5.5 | 8.4 | 8.1 | 7.3 |
| Primo 1.50 oz mat/M | 7.3 | 7.0 | 5.7 | 8.7 | 8.8 | 7.6 |
| Progibb 1/2 plot [1](Primo 1.50 oz mat/M trt.) | 13.3 | 13.0 | 10.0 | 9.0 | 9.2 | 10.8 |
| Florel 4 lb ai/A | 9.7 | 7.3 | 5.3 | 8.2 | 7.8 | 7.7 |
| Primo 0.75 oz/M withPaclobutrazol 0.375 lb ai/A | 8.3 | 8.0 | 5.0 | 8.8 | 8.8 | 7.8 |
| EXP 31039A 2 lb ai/A | 8.3 | 7.7 | 6.3 | 8.7 | 8.0 | 7.8 |
| Primo 0.75 oz/M with Cutless 1 lb ai/A | 7.7 | 6.3 | 5.3 | 9.7 | 10.5 | 7.9 |
| Primo 2.25 oz mat/M | 7.0 | 7.0 | 5.7 | 9.0 | 10.7 | 7.9 |
| N 0.75 lb/M 1/2 plot (Primo 2.25 oz mat/M trt.) | 7.0 | 7.0 | 5.7 | 8.3 | 11.3 | 7.9 |
| Primo 2.25 oz mat/M | 8.7 | 7.3 | 4.7 | 9.7 | 10.0 | 8.1 |
| Progibb 1/2 plot (Primo 2.25 oz mat/M trt.) | 13.3 | 12.7 | 10.7 | 9.0 | 9.7 | 11.1 |
| Primo 0.75 oz mat/M | 8.0 | 7.0 | 6.0 | 10.5 | 10.0 | 8.3 |
| Primo 1.50 oz mat/M with Urea 0.75 lb N/M | 9.0 | 8.3 | 7.0 | 9.7 | 10.2 | 8.8 |
| Progibb 1/2 plot (Primo 1.50 oz mat/M with Urea 0.75 lb N/M trt.) | 13.7 | 13.7 | 10.7 | 9.7 | 10.3 | 11.6 |
| Cutless 1 lb ai/A | 9.7 | 10.0 | 10.0 | 9.7 | 9.8 | 9.8 |
| UTC | 9.0 | 10.0 | 11.0 | 10.2 | 9.7 | 10.0 |
| Primo 1.50 oz mat/M with Progibb 0.25 oz/M | 12.7 | 13.3 | 12.0 | 8.0 | 8.5 | 10.9 |
| Progibb 1/2 plot (Primo 1.50 oz mat/M with Progibb 0.25 oz/M trt.) | 12.7 | 14.7 | 12.0 | 7.3 | 7.8 | 10.9 |
| $LSD_{0.05}$ | 0.6 | 0.8 | 0.9 | 1.7 | 0.5 | 0.2 |

[1] Progibb applied to half the plot at 0.25 oz/M

**Table 3.** Fresh clipping weights in grams of Huntsville Kentucky bluegrass in response to growth regulators 1994 Southern Illinois University.

| | Days After Treatment, 6/29 | | | | | | |
|---|---|---|---|---|---|---|---|
| Treatment | 9 | 17 | 27 | 35 | 44 | 58 | Total |
| Primo 1.50 oz mat/M | 32.2 | 6.8 | 3.2 | 4.3 | 48.3 | 16.4 | 111.1 |
| Progibb $^1/_2$ plot[1] (Primo 1.50 oz mat/M trt.) | 77.7 | 10.7 | 7.4 | 10.3 | 72.4 | 24.7 | 203.4 |
| Florel 4 lb ai/A | 47.8 | 1.5 | 3.4 | 5.7 | 50.9 | 10.0 | 119.2 |
| EXP 31039A 4 lb ai/A | 40.6 | 6.7 | 8.8 | 5.7 | 51.8 | 16.5 | 130.2 |
| Primo 0.75 oz/M | 37.8 | 1.2 | 3.9 | 11.7 | 63.6 | 17.8 | 136.1 |
| Primo 2.25 oz mat/M | 32.2 | 1.2 | 3.8 | 8.1 | 64.6 | 28.1 | 138.0 |
| N 0.75 lb/M $^1/_2$ plot (Primo 2.25 oz mat/M trt.) | 32.8 | 2.2 | 5.3 | 8.8 | 65.7 | 28.6 | 143.4 |
| Primo 1.50 oz mat/M with Progibb 0.25 oz/M | 80.3 | 4.7 | 2.5 | 3.6 | 38.9 | 12.1 | 142.1 |
| Progibb $^1/_2$ plot (Primo 1.50 oz mat/M with Progibb 0.25 oz/M trt.) | 88.7 | 6.7 | 3.2 | 4.3 | 36.6 | 12.4 | 151.9 |
| Primo 2.25 oz mat/M | 53.0 | 3.0 | 3.0 | 5.4 | 61.4 | 24.5 | 150.1 |
| Progibb $^1/_2$ plot (Primo 2.25 oz mat/M trt.) | 94.1 | 9.5 | 3.2 | 9.9 | 82.0 | 30.4 | 229.2 |
| Primo 0.75 oz/M with Cutless 1 lb ai/A | 51.9 | 1.6 | 4.5 | 6.9 | 77.5 | 26.3 | 168.7 |
| Cutless 1 lb ai/A | 44.3 | 8.4 | 12.1 | 11.8 | 65.3 | 27.6 | 170.8 |
| Primo 1.50 oz mat/M with Urea 0.75 lb N/M | 51.5 | 24.7 | 3.3 | 6.7 | 68.1 | 18.3 | 172.6 |
| Progibb $^1/_2$ plot (Primo 1.50 oz mat/M with Urea 0.75 lb N/M trt.) | 88.4 | 27.8 | 6.9 | 10.3 | 72.9 | 25.3 | 231.4 |
| EXP 31039A 2 lb ai/A | 56.8 | 19.6 | 10.4 | 16.3 | 63.7 | 11.4 | 178.2 |
| Primo 0.75 oz mat/M | 37.5 | 1.1 | 11.8 | 14.7 | 89.6 | 23.8 | 178.6 |
| UTC | 56.3 | 13.8 | 16.9 | 16.7 | 77.8 | 16.7 | 198.1 |
| $LSD_{0.05}$ | 8.9 | 3.8 | 1.4 | 2.2 | 5.8 | 4.1 | 6.6 |

[1] Progibb applied to half the plot at 0.25 oz/M

# *PLANT PATHOLOGY FIELD RESEARCH CONDUCTED AT THE UNIVERSITY OF ILLINOIS*

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

Fungicide trials in 1994 included four separate trials conducted at the Urbana, IL Research Center: one for dollar spot, one brown patch, and two for summer patch. The study of fungicide control of resistant populations of the fungi which cause dollar spot was continued for the third year at the Ridgemoor Country Club in Chicago, IL. A severe infestation of dollar spot and brown patch developed on the bentgrass green at the Urbana Research Center. The dollar spot plot (Plot 5), therefore, was also rated for brown patch and the brown patch (Plot 3) results include ratings for dollar spot severity. Unfortunately, dollar spot did not develop at the Ridgemoor Country Club location. No efficacy data is available from Chicago on resistant dollar spot fungi this year. Summer patch was evaluated in two plots in Urbana, one having a natural disease infestation and one being artificially inoculated with the pathogen. No disease symptoms developed in the artificially inoculated plot (Plot 1), therefore summer patch data is from the naturally infested area (Plot 2). Treatments, results, and the interpretation of results are presented.

Data for efficacy is reported for the three diseases evaluated at the Urbana Research Center. The diseases were evaluated as follows. The data values represent the percentage of area within a plot that is blighted by dollar spot or brown patch symptoms. The greater the number, the poorer the disease control. Generally, the severity of the brown patches changed rapidly. The reason for this, was the rapid rate of grass growth and recovery from disease. If a chemical fungicide controls brown patch, then the grass growth will rapidly (less than a week) mask the symptoms. We do not consider it adequate control, if the symptoms of brown patch were weak and still visible. Any treatment having a 0.67 or less rating for disease symptoms reduced brown patch severity. In our opinion, however, only a rating of less than 0.3, after the second or third application, was an acceptable level of control. No treatment in the dollar spot or brown patch plots produced any injury or discoloration to the turfgrass.

The data values for summer patch represent the percentage of area within the plot that is discolored and shows summer patch symptoms. The intensity of the disease was rated using a scale of 0-2. Zero equals low intensity but noticeable disease; one equals moderate intensity (off-colored leaf tissue but not necrotic); and two equals high intensity with brown and necrotic leaf tissue.

This year one trial included urea. In past years, we have found that mixing urea with fungicides has been very effective in reducing the amount of required fungicide, while improving the control of dollar spot and increasing turf quality. This year the tankmix did not control dollar spot more effectively than the chemical treatment alone.

This fertilizer tank mix concept was expanded to the control of brown patch. Instead of urea, an organic fertilizer was used but there was no clear indication that the addition of an organic fertilizer enhanced the control of brown patch. Dollar spot control in this same area, however, did seem to respond favorably to this treatment.

Most fungicide treatments provided adequate control of dollar spot at the Urbana location. All the fungicide treatments provided adequate control of brown patch at the

| | |
|---|---|
| **Research Protocol:** | **Bentgrass Dollar Spot Fungicide Trial** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | pathogen inoculation: natural inoculum, no artificial inoculum was applied; fertilized at 2.5 kg N/M/yr; pesticides applied as need. |
| **Plot Maintenance:** | mowing height- 0.63 cm every other day; irrigation- natural rainfall plus 2.5 cm/week if needed. topdressing- bimonthly; 80:20 sand/soil mixture. |
| **1994** | Initial Fungicide Treatments applied on Julian day 173 (June 22, 1994). Additional applications applied at a 14, 21 or 28 day intervals. Last application on Julian day 230 (August 18, 1994). applied in 12.5 L water/M; plot size- 4 ft x 5 ft. |
| **Experimental Design:** | RCB; 3 replications. |

Urbana location. The summer patch disease pressure on the Urbana farm decreased in the plot naturally towards the end of July. The last fungicide treatment was applied on July 19, 1994. All treatments provided good control and reduced the discoloration of the turf for up to one month after the last treatment. After this time, however, some plots still had patch symptoms which were moderately intense.

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

## Fungicide Control Of Dollar Spot On Bentgrass

Dollar spot continues to develop on creeping bentgrass, bluegrass, ryegrass and several other minor grasses. In addition, resistance to the fungicides by the fungal pathogens that cause this disease is a continuing threat.

Testing the efficacy and continuing to evaluate the rates and timing intervals of experimental and registered fungicides was the focus of the 1994 research program. Also tested this year was the integration of fungicides with nitrogen fertilizer. Plots were evaluated for dollar spot (Figures 1a-1f) and brown patch (Figures 1g-1l) nine times throughout the growing season.

**Table 1.** 1994 Dollar Spot Research - Plot 5

| Trt. No. | Manufacturer | Chemical Name | Rate (cf oz/M) | Rate (cf/liter) | Spray Interval (in days) |
|---|---|---|---|---|---|
| 1. | Rhone Poulenc | EXP10452A | 0.5 | 0.85 g | 14 |
| 2. | Rhone Poulenc | EXP10452A | 0.75 | 1.27 g | 14 |
| 3. | Rhone Poulenc | EXP10370A | 1.5 | 2.5 g | 14 |
| 4. | Rhone Poulenc | EXP10370A | 2.0 | 3.4 g | 14 |
| 5. | Rohm-Haas | Eagle 40W | 0.6 | 1.02 g | 28 |
| 6. | Isk | Daconil 2787 4.17F | 6.0 | 10.6 ml | 14 |
| 7. | Isk | Daconil 825 SDG | 3.8 | 6.5 g | 14 |
| 8. | Isk | Fluazinam 500F | 0.5 | 0.88 ml | 14 |
| 9. | Isk | Fluazinam 500F | 1.0 | 1.8 ml | 21 |
| 10. | Isk | ASC-67098 Z | 3.6 | 6.1 g | 21 |
| 11. | Isk | Fluazinam 75 SDG | 0.67 | 1.14 g | 21 |
| 12. | Terra | Thalonil 90DF | 3.5 | 5.9 g | 14 |
| 13. | Terra | TRA-0028 (Thalonil 4L) | 6.0 | 10.6 ml | 14 |
| 14. | DowElanco | Rubigan 50W | 0.25 | 0.42 g | 14 |
| 15. | DowElanco | Rubigan 50W | 0.25 | 0.42 g | 21 |
| 16. | DowElanco | Rubigan 50 WSP | 0.125 | 0.21 g | 14 |
| 17. | DowElanco | Rubigan 50 WSP + Urea | 0.25 + 8.0 | 0.42 + 13.6 g | 14 |
| 18. | DowElanco | Rubigan 50 WSP + Urea | 0.125 + 8.0 | 0.21 + 13.6 g | 14 |
| 19. | BASF | Curalan DF | 2.0 | 3.4 g | 21 |
| 20. | BASF | Curalan DF | 2.0 | 3.4 g | 28 |
| 21. | Ciba | Banner 1.1.E | 0.5 | 0.88 ml | 14 |
| 22. | Ciba | Banner + Daconil 2787 | 0.5 + 4.0 | 0.88 + 7.1 ml | 14 |
| 23. | Ciba | Banner + Daconil 2787 | 1.0 + 4.0 | 1.8 + 7.1 ml | 21 |
| 24. | Ciba | Banner + ProStar 50 WP | 0.5 + 2.0 | 0.88 ml + 3.4 g | 14 |
| 25. | Ciba | Banner + ProStar 50 WP | 1.0 + 2.0 | 1.8 ml + 3.4 g | 21 |
| 26. | --- | Urea | 8.0 | 13.6 g | 14 |
| 27. | Sandoz | Sentinel 40 WG | 0.16 | 0.27 g | 28 |
| 28. | Sandoz | Sentinel 40 WG | 0.25 | 0.42 g | 28 |
| 29. | Sandoz | Sentinel 40 WG | 0.25 | 0.42 g | 42 |
| 30. | --- | Water | --- | --- | --- |

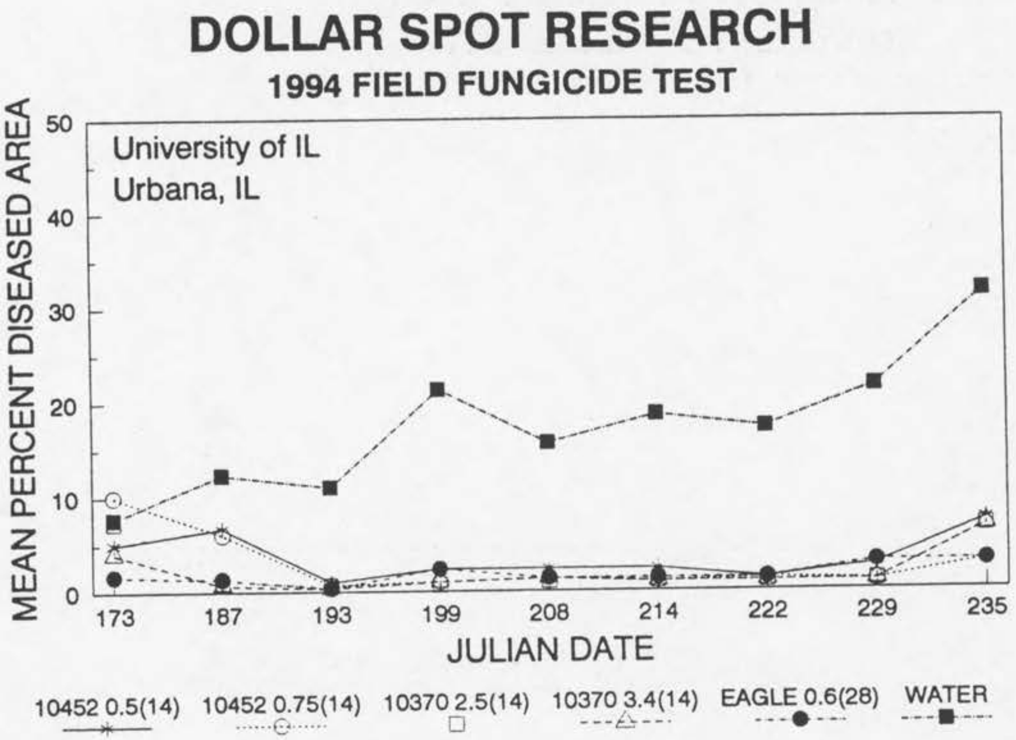



**Figure 1a.** Control of dollar spot on bentgrass.

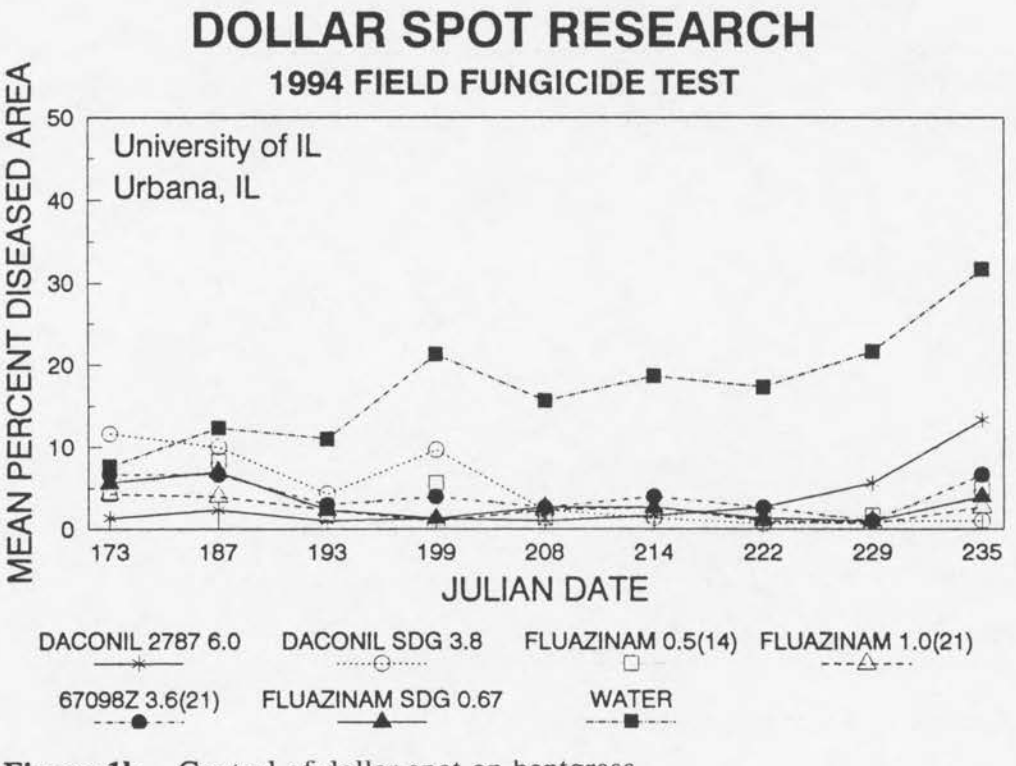



**Figure 1b.** Control of dollar spot on bentgrass.

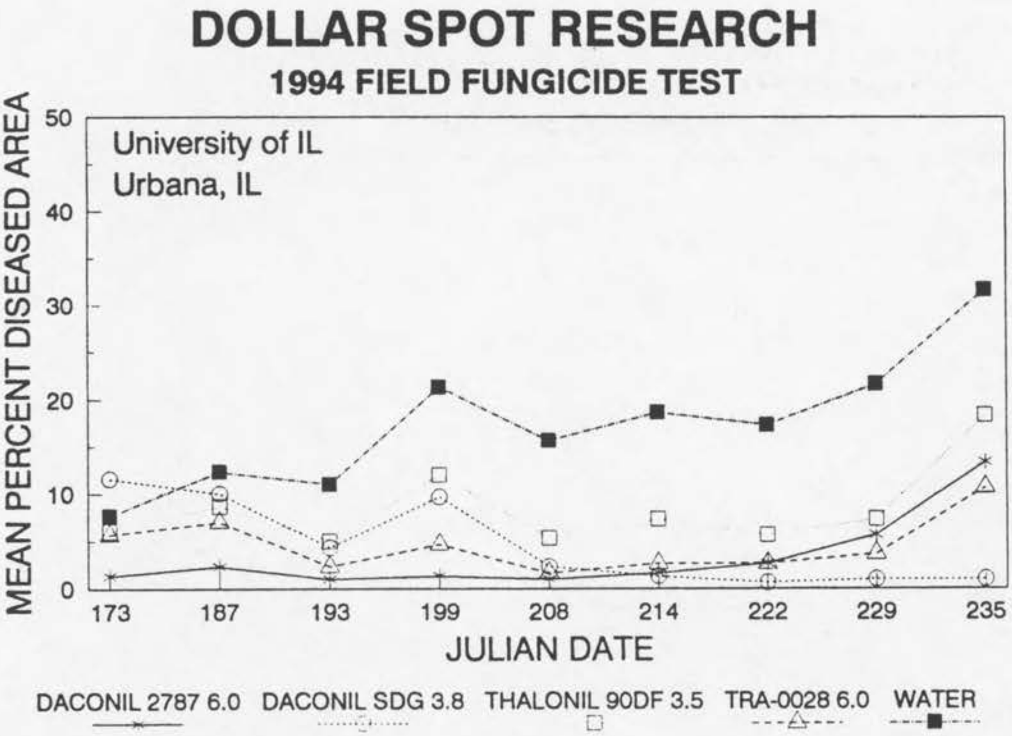



**Figure 1c.** Control of dollar spot on bentgrass.

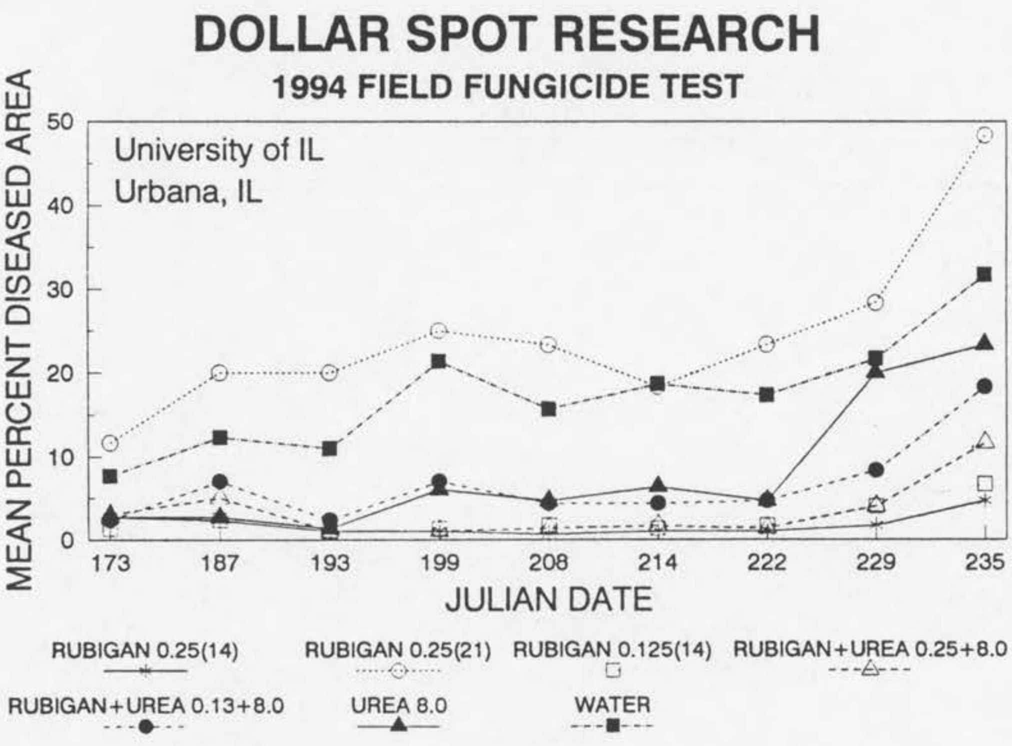



**Figure 1d.** Control of dollar spot on bentgrass.

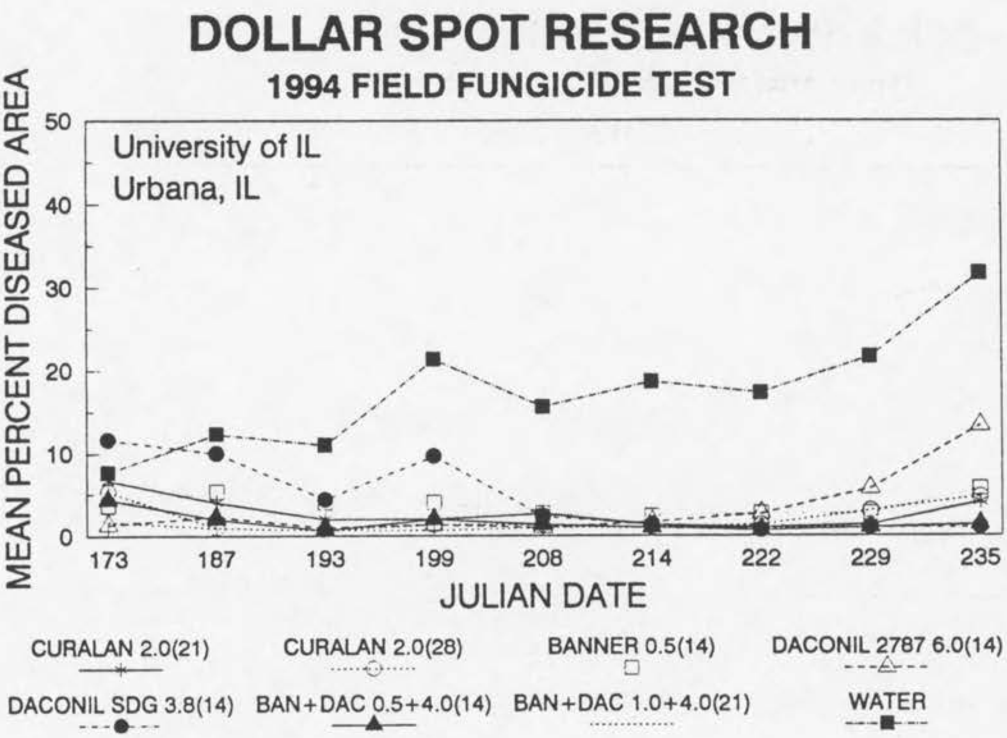



**Figure 1e.** Control of dollar spot on bentgrass.

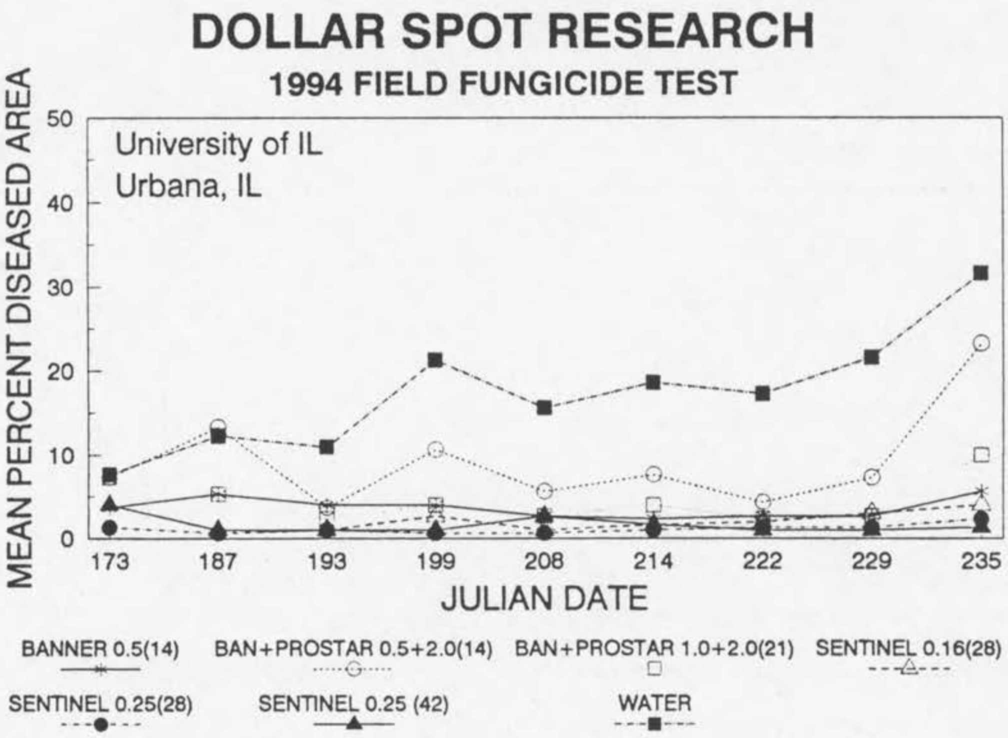



**Figure 1f.** Control of dollar spot on bentgrass.

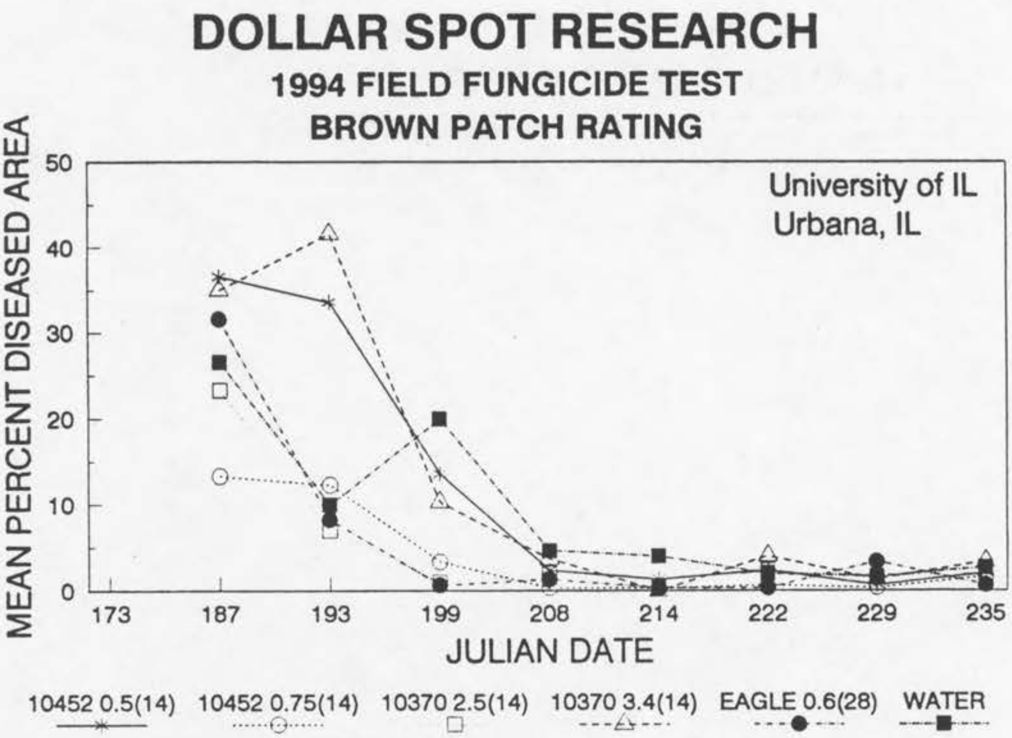



**Figure 1g.** Control of brown patch on bentgrass within the dollar spot trial.

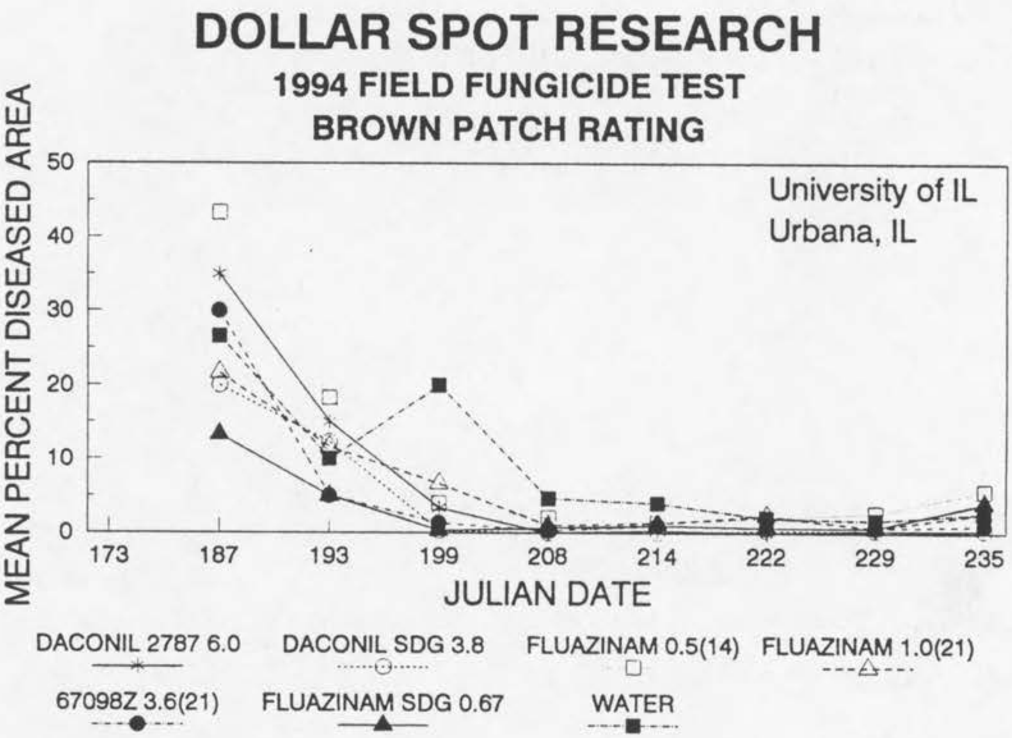



**Figure 1h.** Control of brown patch on bentgrass within the dollar spot trial.

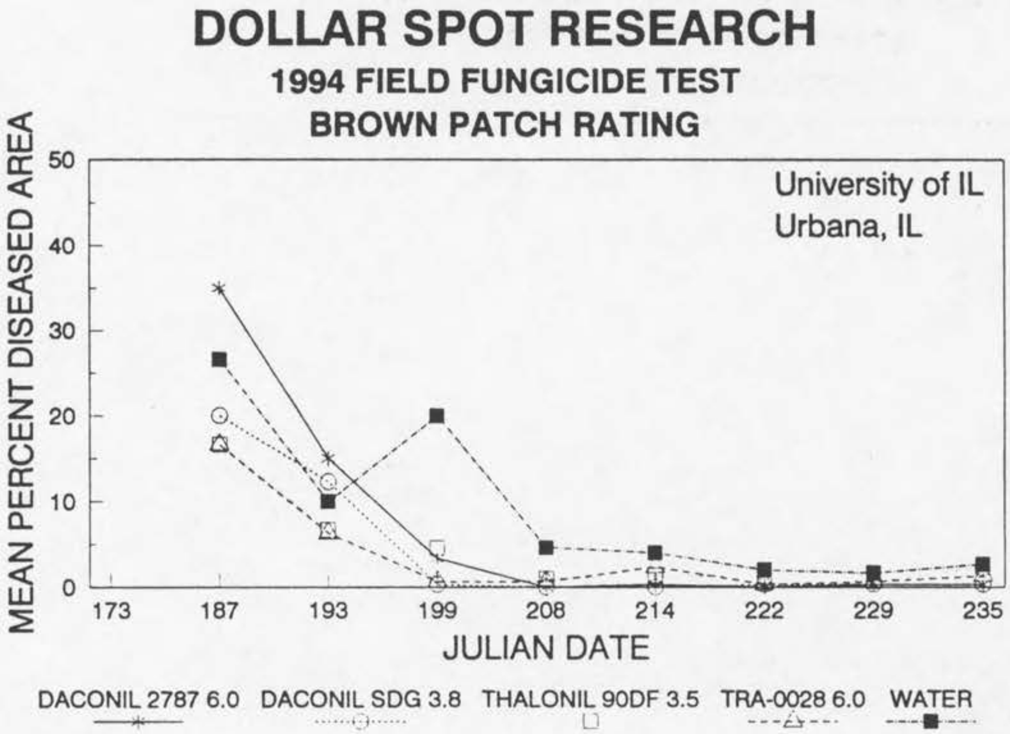



**Figure 1i.** Control of brown patch on bentgrass within the dollar spot trial.

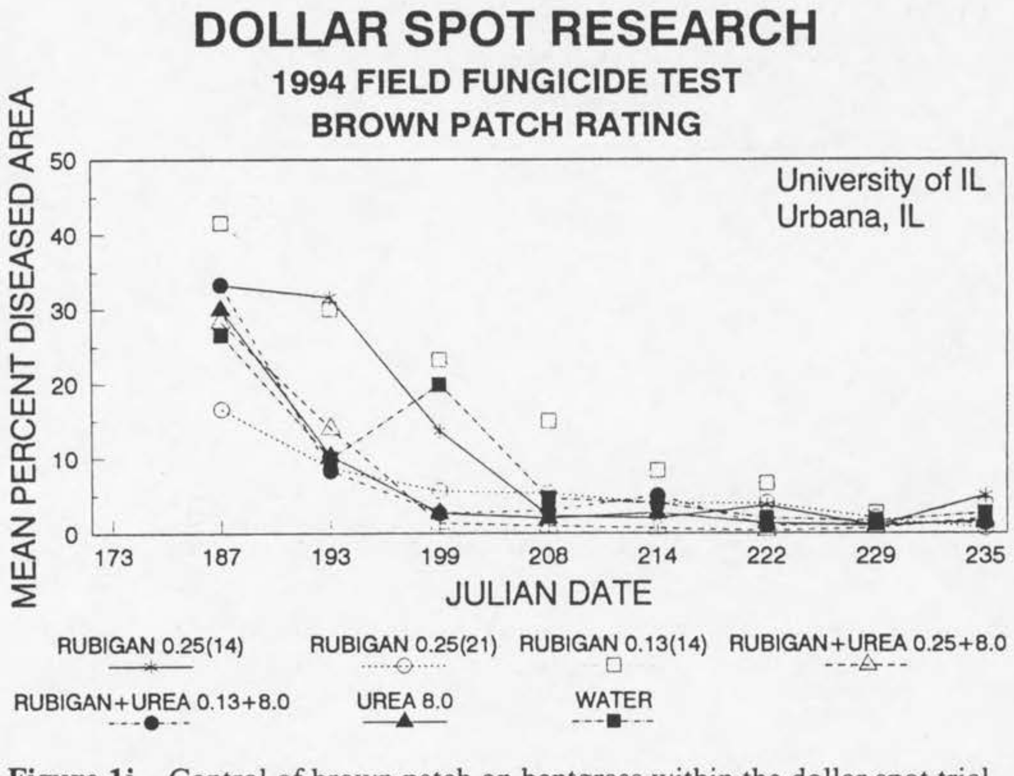



**Figure 1j.** Control of brown patch on bentgrass within the dollar spot trial.

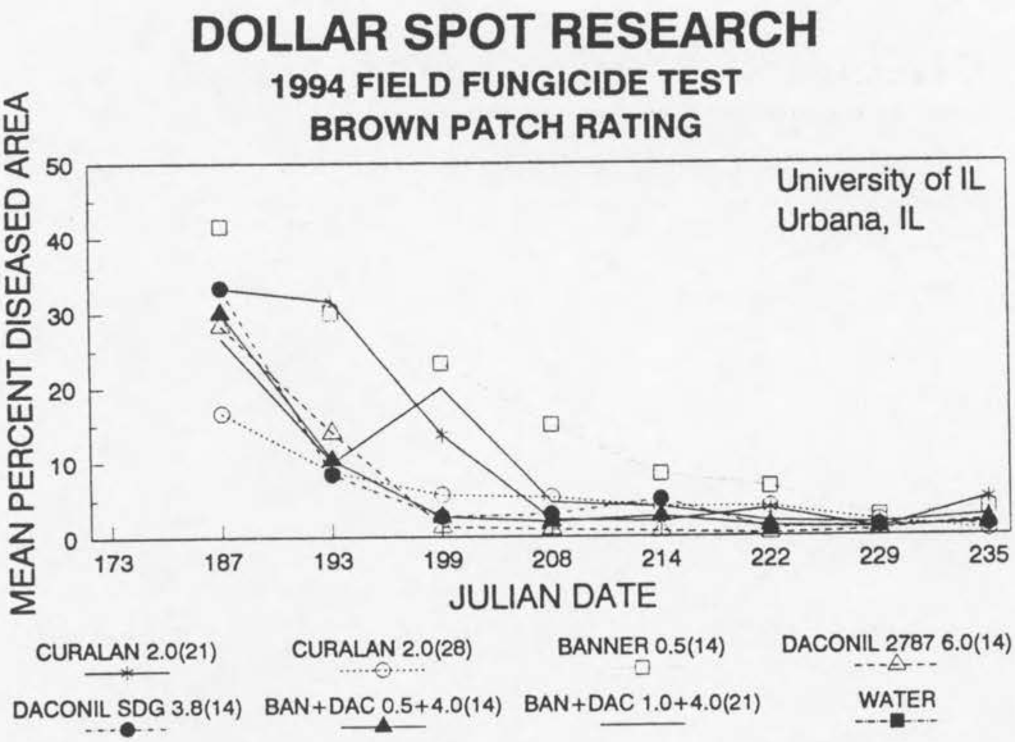



**Figure 1k.** Control of brown patch on bentgrass within the dollar spot trial.

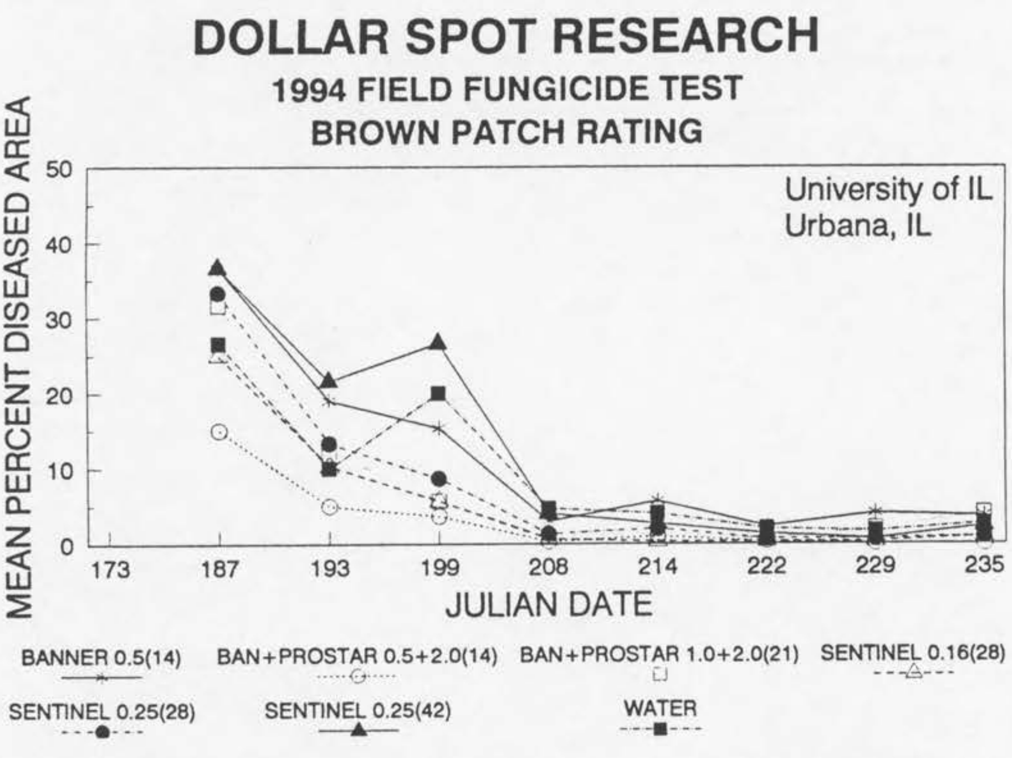



**Figure 1l.** Control of brown patch on bentgrass within the dollar spot trial.

## Fungicide Trials For The Control Of Dollar Spot On Bentgrass At Ridgemoor Country Club, Chicago

| | |
|---|---|
| **Research Protocol:** | **Bentgrass Dollar Spot Fungicide Trial** |
| **Location:** | Ridgemoor Country Club, Chicago, IL |
| **Site Preparation:** | pathogen inoculation - natural infestation; fertilization - 2.5 kg N/M/yr; pesticides - applied as need. |
| **Plot Maintenance:** | mowing height - 0.3 cm every other day; irrigation - natural rainfall plus 2.5 cm/week if needed. topdressing - none. |
| **1994** | initial fungicide treatments - applied on Julian day 198 (July 15, 1994); Additional applications - be applied at 14, 21 or 28 day intervals; applied in 27.7 L water/M; plot size- 3 ft x 3 ft. |

Previous work, in 1992 and 1993, with dollar spot at this site indicated some evidence of fungicidal resistance by the fungus that causes this disease. This fungus has shown resistance to fungicides in the past, however, the resistance we previously observed was being expressed against a different class of chemicals. In 1994, this fungicide trial was to continue looking at the dynamics of this phenomenon that was observed in 1992 and 1993, as well as, test the efficacy of new chemicals and evaluate registered fungicides. All fungicide treatments were applied on July 15, 1994. After this application, however, the trial was discontinued because there was no disease development.

**Table 2.** 1994 dollar spot research at Ridgemoor Country Club (no disease development).

| Trt. No. | Manufacturer | Chemical Name | Rate cf oz/M | Rate cf/liter | Spray Interval (days) |
|---|---|---|---|---|---|
| 1. | Rohm-Haas | Eagle 40 W | 0.6 | 0.61 g | 28 |
| 2. | Rohm-Haas | Eagle 40 W + Urea | 0.6 + 8.0 | 0.61+ 8.2 g | 28 |
| 3. | Rohm-Haas | Eagle 40 W + Urea | 0.6 + 16 | 0.61 + 16.3 g | 28 |
| 4. | Zeneca | ICIA5504 + Daconil 2787 | 0.4 + 3.0 | 0.41 g + 3.2 ml | 14 |
| 5. | Zeneca | ICIA5504 + Daconil 2787 | 0.4 + 3.0 | 0.41 g + 3.2 ml | 21 |
| 6. | Zeneca | ICIA5504 + Daconil 2787 | 0.4 + 3.0 | 0.41 g + 3.2 ml | 28 |
| 7. | Zeneca | ICIA5504 + Daconil 2787 + Chipco | 0.4 + 3.0 + 2.0 | 0.41 g + 3.2 + 2.1 ml | 21 |
| 8. | Zeneca | ICIA5504 + Chipco 26019 | 0.4 + 2.0 | 0.41 g + 2.1 ml | 14 |
| 9. | Zeneca | ICIA5504 + Chipco 26019 | 0.4 + 2.0 | 0.41 g + 2.1 ml | 21 |
| 10. | Zeneca | ICIA5504 + Chipco 26019 | 0.4 + 2.0 | 0.41 g + 2.1 ml | 28 |
| 11. | Zeneca | Daconil 2787 | 3.0 | 3.2 ml | 14 |
| 12. | Zeneca | Chipco 26019 | 2.0 | 2.1 ml | 14 |
| 13. | Zeneca | ICIA5504 50 WG | 0.4 | 0.41 g | 14 |
| 14. | --- | Urea | 8.0 | 8.2 g | 28 |
| 15. | --- | Urea | 16.0 | 16.3 g | 28 |
| 16. | Isk | Fluazinam 500F | 0.5 | 0.53 ml | 14 |
| 17. | Isk | Fluazinam 500F | 1.0 | 1.1 ml | 28 |
| 18. | --- | Water | | | |
| 19. | Ciba | CGA 173506 | 5.0 g | 0.18 g | 14 |
| 20. | Ciba | CGA 173506 | 7.0 g | 0.25 g | 14 |

## Fungicide Control Of Brown Patch On Bentgrass

| | |
|---|---|
| **Research Protocol:** | **Bentgrass Brown Patch Fungicide Trial** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL. |
| **Site Preparation:** | pathogen inoculation - natural infestation and laboratory produced inoculum<br>*Rhizoctonia solani* applied once at 2.2 kg/M;<br>fertilization - 2.5 kg N/M/yr;<br>pesticides - applied as need. |
| **Plot Maintenance:** | mowing height - 0.63 cm every other day;<br>irrigation - natural rainfall plus 2.5 cm/week if needed ;<br>irrigation after inoculation - 0.5 cm of water every 8 hrs for a period of 5 days;<br>topdressing - bimonthly; 80:20 sand/soil mixture. |
| **1994** | initial fungicide teatments - applied on Julian day 174 (June 23, 1994);<br>additional applications - applied at a 14, 21 or 28 day intervals;<br>last application Julian day 216 (August 4, 1994);<br>applied in 27.7 L water/M;<br>plot size- 3 ft x 4 ft. |
| **Experimental Design:** | CRD;<br>3 replications. |

The brown patch disease remains a problem on bentgrass golf greens in the Mid-west, because it develops each year and there are no exceptional control programs for it. This season, 35 different treatments were applied to diseased bentgrass and evaluated for their ability to control brown patch. Once again, this season we used a combination of natural and artificial inoculum of the pathogen to insure adequate disease pressure. We feel the results are meaningful. The research area had a uniform infestation of brown patch. We will continue to use this method to insure good pathogen pressure and reliable test results. It should be pointed out, that the pathogen (*Rhizoctonia solani*) used to inoculate the grass was the same as that which naturally inhabits the green. Plots were evaluated for brown patch (Figures 2a-2f) and dollar spot (Figures 2g-2l) nine times throughout the growing season.

**Table 3.** 1994 brown patch research - plot 3.

| Trt. No. | Manufacturer | Chemical Name | Rate oz cf/M | Rate cf/L | Spray Interval (days) |
|---|---|---|---|---|---|
| 1. | ISK | Daconil 2787 | 6.0 | 6.4 ml | 14 |
| 2. | ISK | Daconil 825 SDG | 3.8 | 3.9 g | 14 |
| 3. | ISK | Fluazinam 500F | 0.5 | 0.53 ml | 14 |
| 4. | ISK | Fluazinam 500F | 1.0 | 1.1 ml | 21 |
| 5. | Rohm-Haas | Eagle 40W | 0.6 | 0.61 g | 14 |
| 6. | Rohm-Haas | Fore FL | 6.4 | 6.8 ml | 14 |
| 7. | Terra | Thalonil 90 DF | 3.5 | 3.6 g | 14 |
| 8. | Terra | TRA-0028 (Thalonil 4L) | 6.0 | 6.4 ml | 14 |
| 9. | Sandoz | Sentinel 40 WG | 0.16 | 0.16 g | 28 |
| 10. | Sandoz | Sentinel 40 WG | 0.25 | 0.25 g | 28 |
| 11. | Sandoz | Sentinel 40 WG | 0.25 | 0.25 g | 42 |
| 12. | AgrEvo | ProStar 50 WP | 1.5 | 1.5 g | 21 |
| 13. | AgrEvo | ProStar 50 WP + Daconil 2787 F | 1.0 + 4.0 | 1.02 g + 4.3 ml | 21 |
| 14. | BASF | Curalan DF | 2.0 | 2.03 g | 14 |
| 15. | Miles | Bayleton 25 T/O + Chlorothalonil 4.17 | 0.5 + 3.0 | 0.51 g + 3.2 ml | 14 |
| 16. | Miles | Bayleton 25 T/O + ProStar 50 | 0.5 + 2.0 | 0.51 + 2.0 g | 14 |
| 17. | Miles | Bayleton 25 T/O + ProStar 50 | 1.0 + 2.0 | 1.02 + 2.0 g | 21 |
| 18. | Miles | Bayleton 25 T/O + ProStar 50 | 1.0 + 2.0 | 1.02 + 2.0 g | 28 |
| 19. | Miles | Bayleton | 0.5 | 0.51 g | 14 |
| 20. | Miles | Bayleton | 1.0 | 1.02 g | 28 |
| 21. | Ciba | Banner 1.1 E | 0.5 | 0.53 ml | 14 |
| 22. | Ciba | Banner + Daconil 2787 | 0.5 + 4.0 | 0.53 + 4.3 ml | 14 |
| 23. | Ciba | Banner + Daconil 2787 | 1.0 + 4.0 | 1.1 + 4.3 ml | 21 |
| 24. | Ciba | Banner 3.6 GL | 0.5 | 0.53 ml | 14 |
| 25. | Ciba | Banner GL + Daconil | 0.5 + 4.0 | 0.53 + 4.3 ml | 14 |
| 26. | Ciba | Banner GL + Daconil | 0.3 + 4.0 | 0.32 + 4.3 ml | 21 |
| 27. | Zeneca | ICIA5504 | 11.4 | 11.6 g | 14 |
| 28. | Zeneca | ICIA5504 | 11.4 | 11.6 g | 28 |
| 29. | Zeneca | ICIA5504 | 5.7 | 5.8 g | 14 |
| 30. | BioPlus | Banner 1.1 E + BioPlus | 1.0 + 3.6 | 1.1 + 3.8 ml | 28 |
| 31. | Ciba | Banner 1.1 E | 1.0 | 1.1 ml | 28 |
| 32. | BioPlus | BioPlus | 3.6 | 3.8 ml | 14 |
| 33. | Ciba | Banner 1.1 E | 0.5 | 0.53 ml | 14 |
| 34. | BioPlus | Banner + BioPlus | 0.5 + 3.6 | 0.53 + 3.8 ml | 14 |
| 35. | --- | Water | --- | --- | --- |

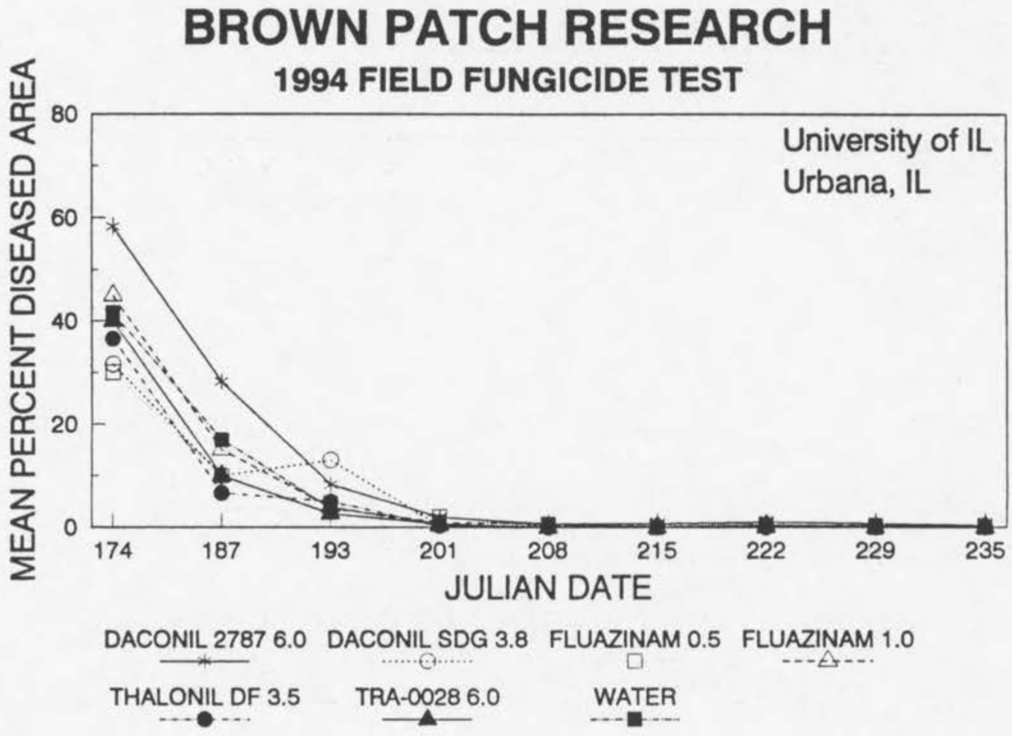



**Figure 2a.** Control of brown patch on bentgrass.

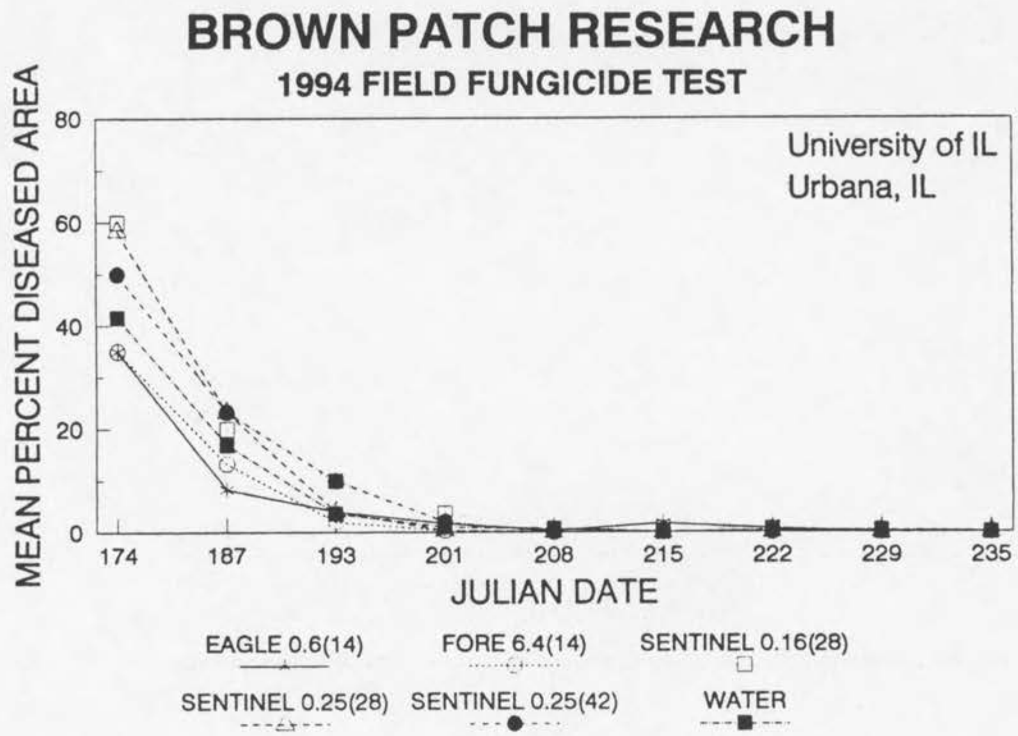



**Figure 2b.** Control of brown patch on bentgrass.

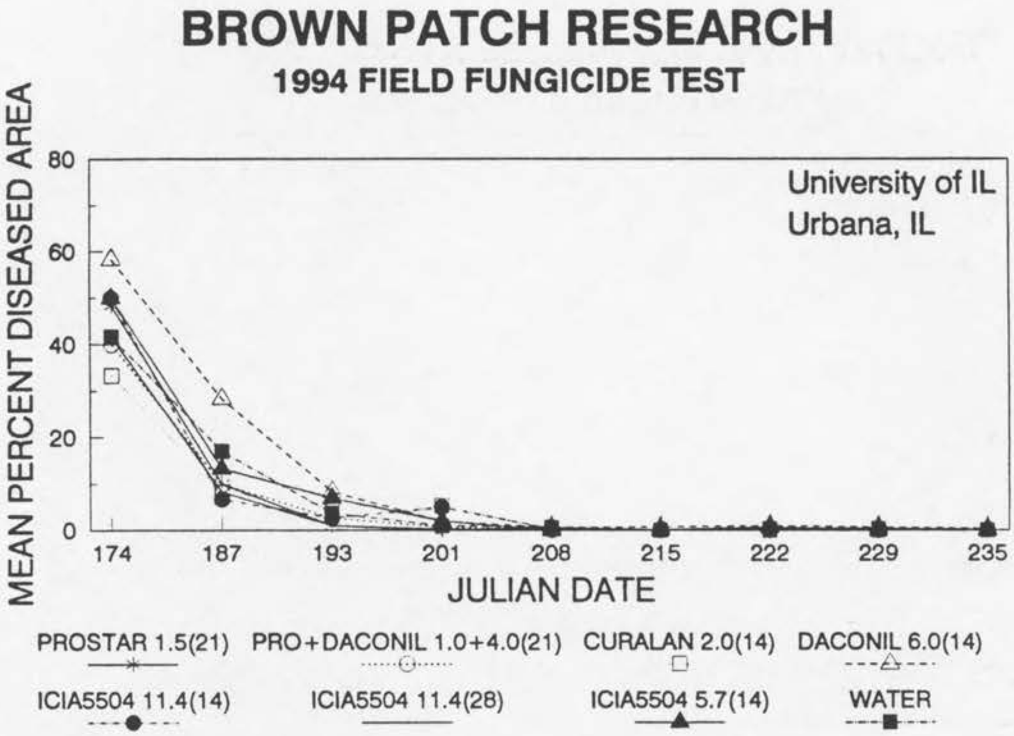



**Figure 2c.** Control of brown patch on bentgrass.

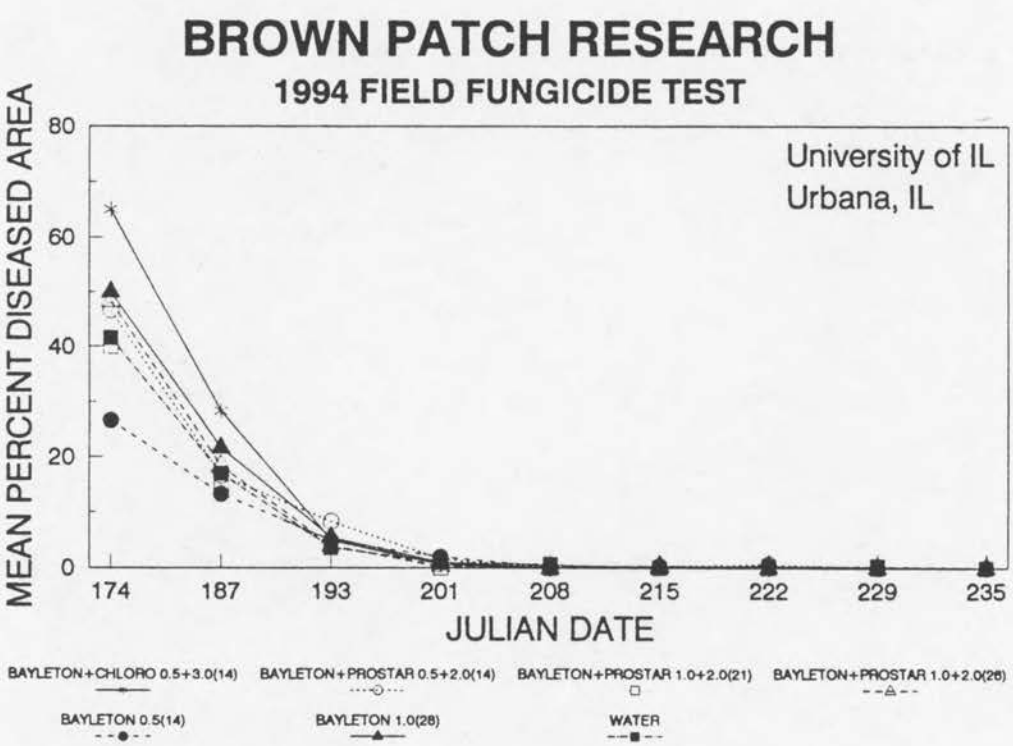



**Figure 2d.** Control of brown patch on bentgrass.

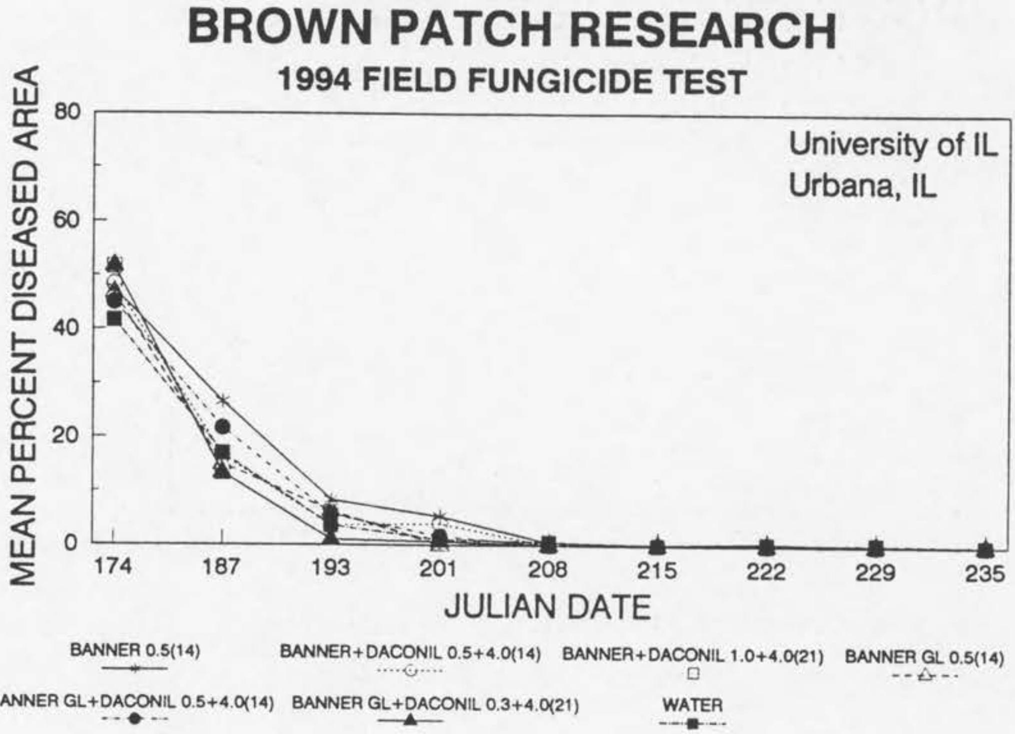



**Figure 2e.** Control of brown patch on bentgrass.

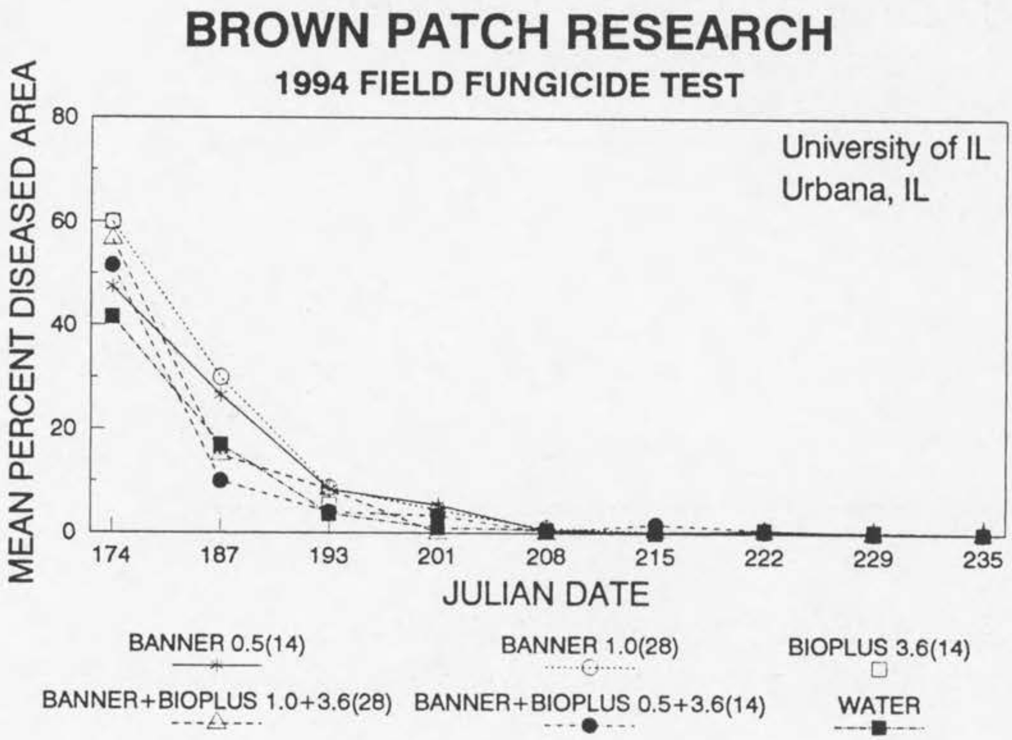



**Figure 2f.** Control of brown patch on bentgrass.

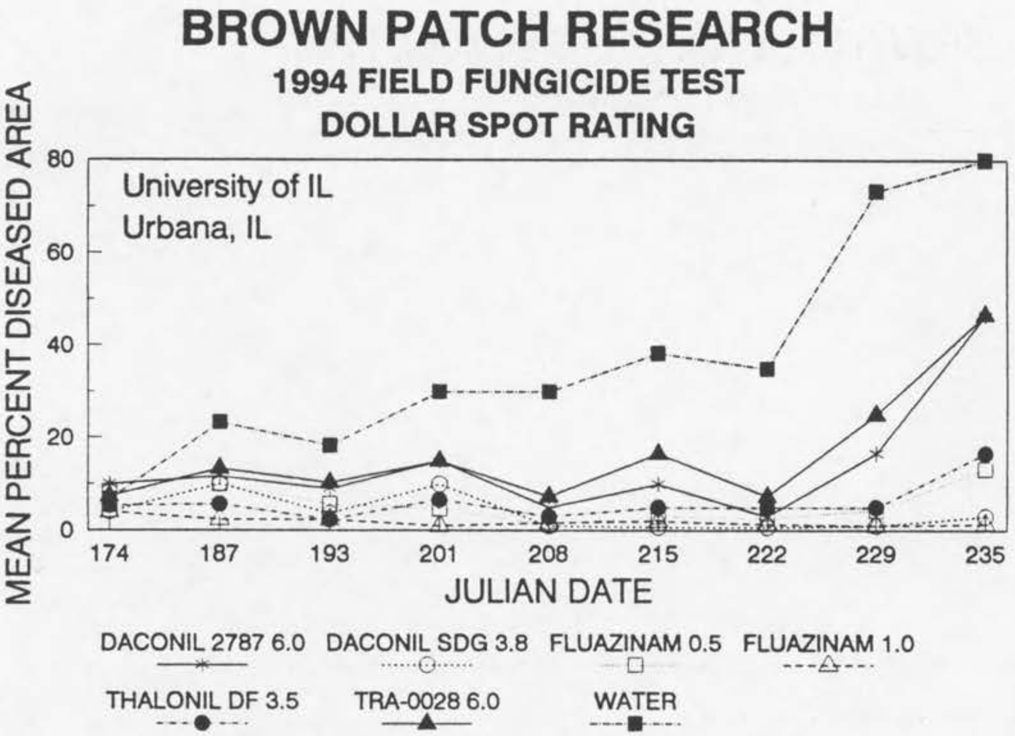



**Figure 2g.** Control of dollar spot on bentgrass within the brown patch trial.

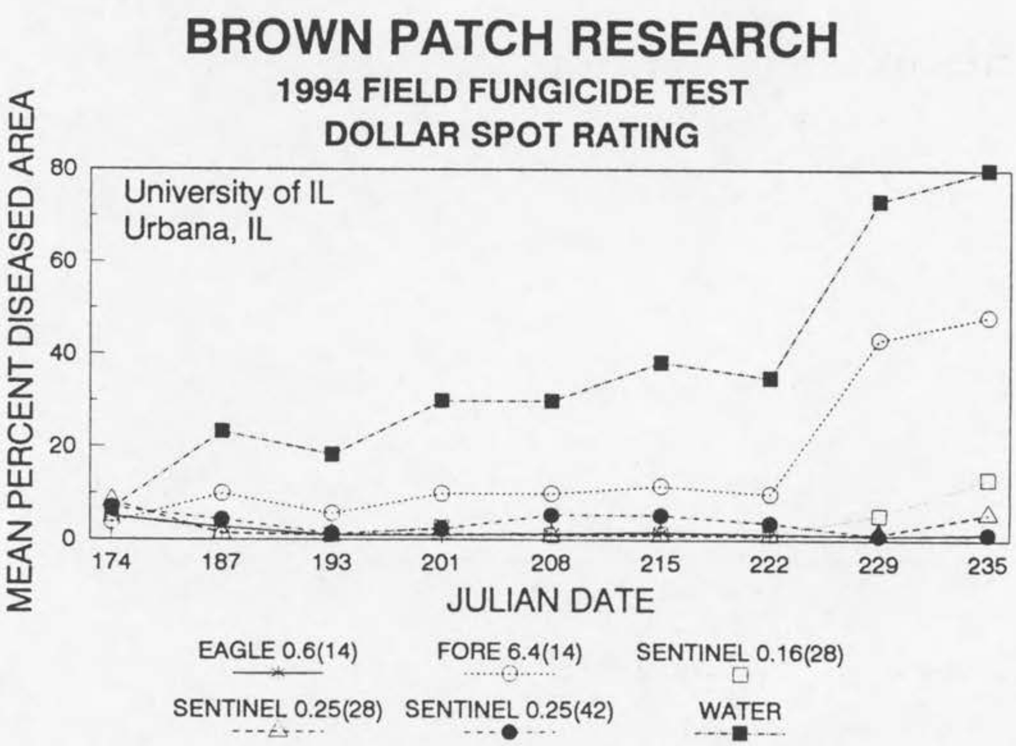



**Figure 2h.** Control of dollar spot on bentgrass within the brown patch trial.

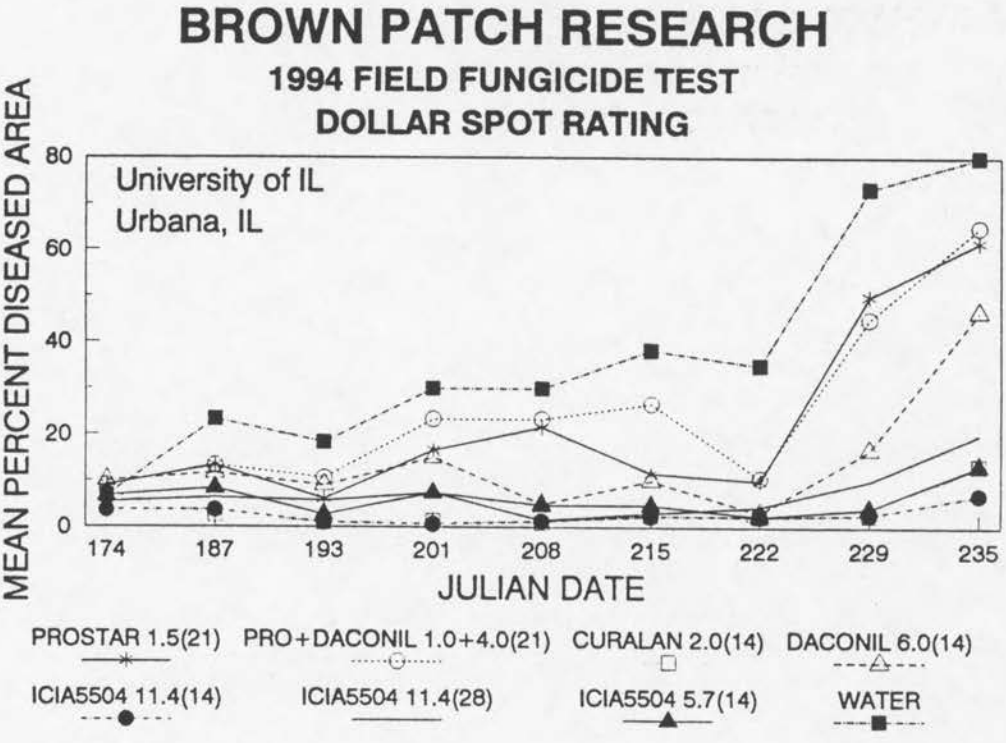



**Figure 2i.** Control of dollar spot on bentgrass within the brown patch trial.

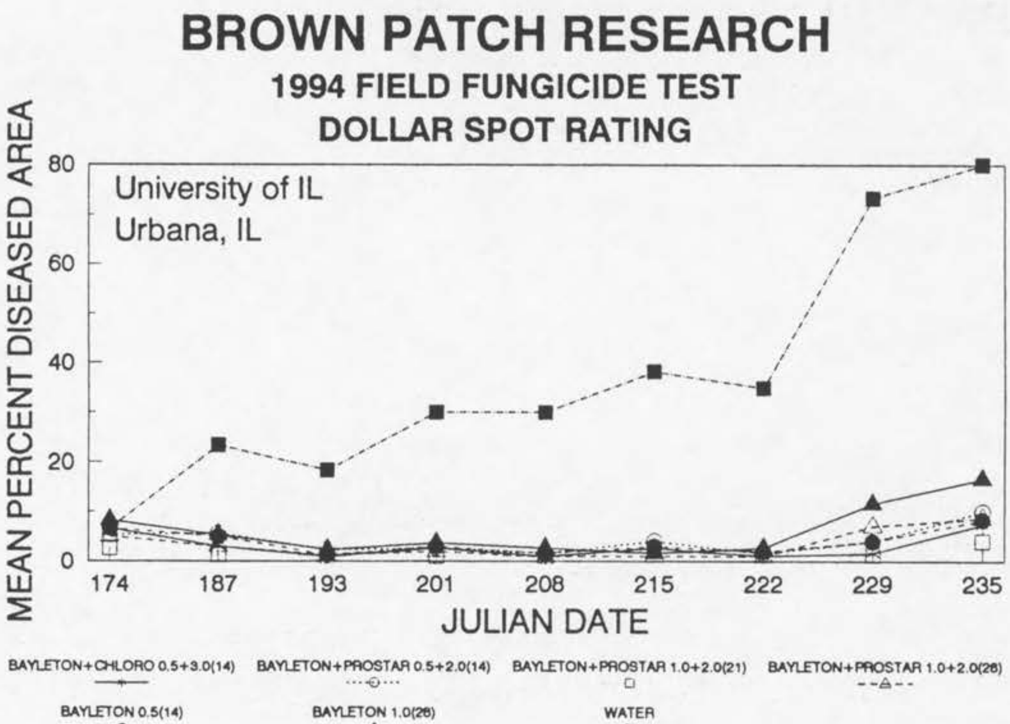



**Figure 2j.** Control of dollar spot on bentgrass within the brown patch trial.

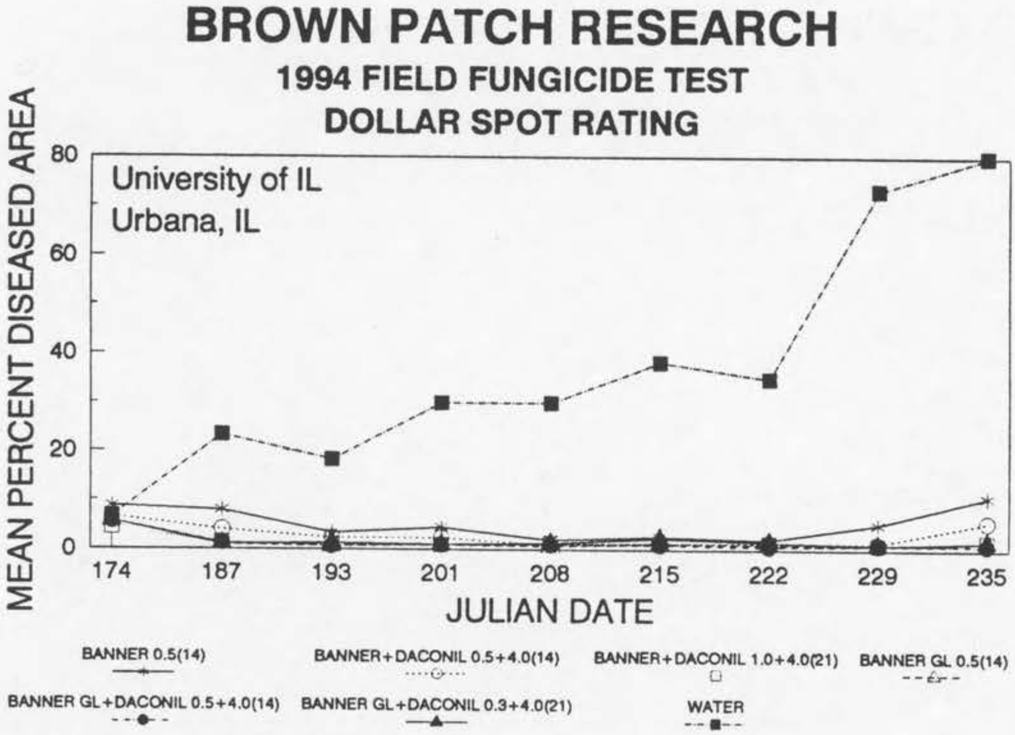



**Figure 2k.** Control of dollar spot on bentgrass within the brown patch trial.

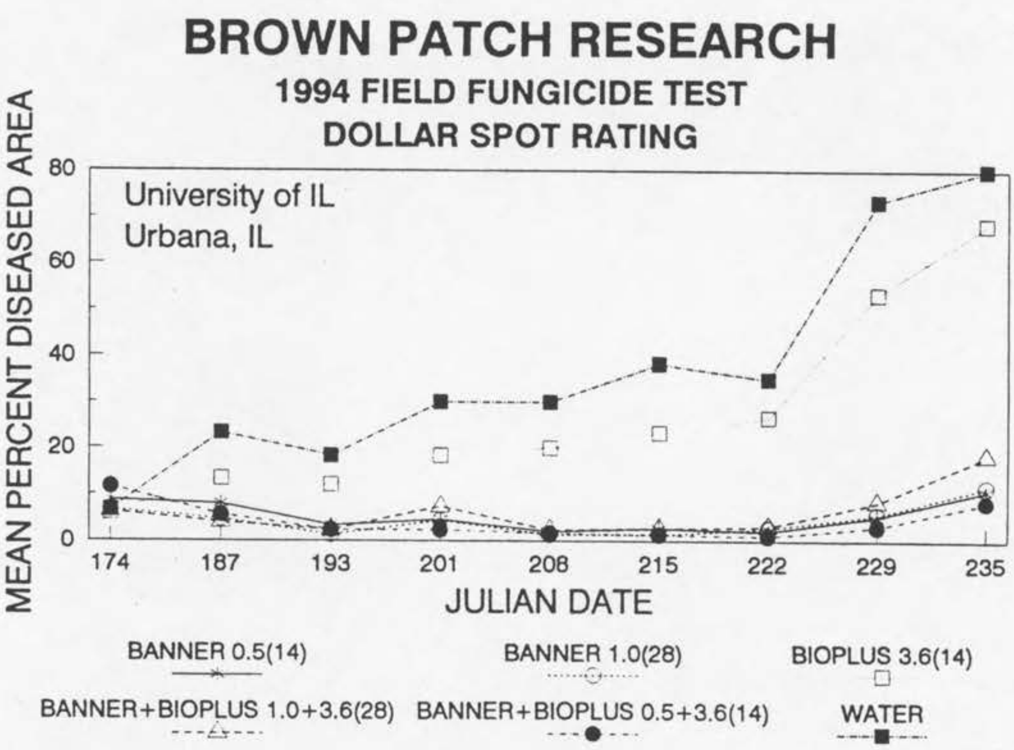



**Figure 2l.** Control of dollar spot on bentgrass within the brown patch trial.

## Fungicide Trials For The Control Of Summer Patch On Bluegrass

| | |
|---|---|
| **Research Protocol:** | **Bluegrass Summer Patch Fungicide Trial** |
| **Location:** | Ornamental Horticulture Research Center, Urbana, IL |
| **Site Preparation:** | pathogen inoculation - natural inoculum and artificial inoculum; fertilization - 0.91 kg N/M/yr; pesticides - applied as need. |
| **Plot Maintenance:** | mowing height - 4.76 cm twice a week; irrigation - natural rainfall plus 2.5 cm/week if needed; topdressing - none. |
| **1994** | initial fungicide treatments - applied on Julian day 145 (May 25, 1994); additional applications - applied at a 14, 21 and 28 day intervals; last application on Julian day 200 (July 19, 1994). applied in 20.8 L water/M; plot size- 3 ft x 4 ft. |
| **Experimental Design:** | RCB 4 replications. |

Two summer patch research plots were established at the University of Illinois Turf Farm on May 19, 1994 to evaluate registered fungicides and test the efficacy of experimental chemicals. In 1993 an area (Plot 1) was established and inoculated with artificial inoculum. No disease developed in 1993. This same area was inoculated and used in 1994. Artificial inoculum was applied to the centers of each plot by placing *Magnaporthe poae* infested millet into two 6.35 cm core holes. The core holes were 7.5 cm deep and the inoculum was placed at a depth below the thatch layer. The plot that was artificially inoculated in 1994 developed no symptoms of summer patch and after several fungicide applications, the treatment program was discontinued.

The second treatment area (Plot 2) developed summer patch from a natural infestation of the fungus. The data (Figures 3a-3d) and research protocol that is presented in this report refers to the summer patch area (Plot 2) which had a natural infestation.

**Table 4.** 1994 Summer Patch Research Plot 1 - Artificial Inoculum (no disease development).

| Trt. No. | Manufacturer | Chemical Name | Rate oz cf/M | Rate cf/liter | Spray Interval (days) |
|---|---|---|---|---|---|
| 1. | Zeneca | ICIA5504 50WG | 0.4 | 0.91 g | 14 |
| 2. | Zeneca | ICIA5504 50WG | 0.4 | 0.91 g | 21 |
| 3. | Zeneca | ICIA5504 50WG | 0.4 | 0.91 g | 28 |
| 4. | Zeneca | ICIA5504 50WG | 0.2 | 0.45 g | 14 |
| 5. | Zeneca | ICIA5504 50WG | 0.2 | 0.45 g | 21 |
| 6. | Rohm Haas | Eagle 40W | 0.6 | 1.36 g | 28 (2x) |
| 7. | ISK | Fluazinam 500F | 0.5 | 1.18 ml | 14 |
| 8. | ISK | Fluazinam 500F | 1.0 | 2.4 ml | 21 |
| 9. | ISK | ASC-67098 Z | 3.6 | 8.15 g | 21 |
| 10. | ISK | Fluazinam 75SDG | 0.67 | 1.52 g | 21 |
| 11. | DowElanco | Rubigan 50W | 0.75 | 1.70 g | 28 (3x) |
| 12. | Ciba | Banner 1.1E | 4.0 | 9.5 ml | 28 |
| 13. | | Water | | | |

**Table 5.** 1994 summer patch research plot 2 - natural infestation.

| Trt. No. | Manufacturer | Chemical Name | Rate oz cf/M | Rate cf/liter | Spray Interval (days) |
|---|---|---|---|---|---|
| 1. | Zeneca | ICIA5504 50WG | 0.4 | 0.54 g | 14 |
| 2. | Zeneca | ICIA5504 50WG | 0.4 | 0.54 g | 21 |
| 3. | Zeneca | ICIA5504 50WG | 0.4 | 0.54 gg | 28 |
| 4. | Zeneca | ICIA5504 50WG | 0.2 | 0.27 g | 14 |
| 5. | Zeneca | ICIA5504 50WG | 0.2 | 0.27 g | 21 |
| 6. | Rohm Haas | Eagle 40W | 0.6 | 0.82 g | 28 (2x) |
| 7. | ISK | Fluazinam 500F | 0.5 | 0.71 ml | 14 |
| 8. | ISK | Fluazinam 500F | 1.0 | 1.4 ml | 21 |
| 9. | ISK | ASC-67098 Z | 3.6 | 4.9 g | 21 |
| 10. | ISK | Fluazinam 75SDG | 0.67 | 0.91 g | 21 |
| 11. | DowElanco | Rubigan 50W | 0.75 | 1.02 g | 28 (3x) |
| 12. | Ciba | Banner 1.1E | 4.0 | 5.7 ml | 28 |
| 13. | | Water | | | |

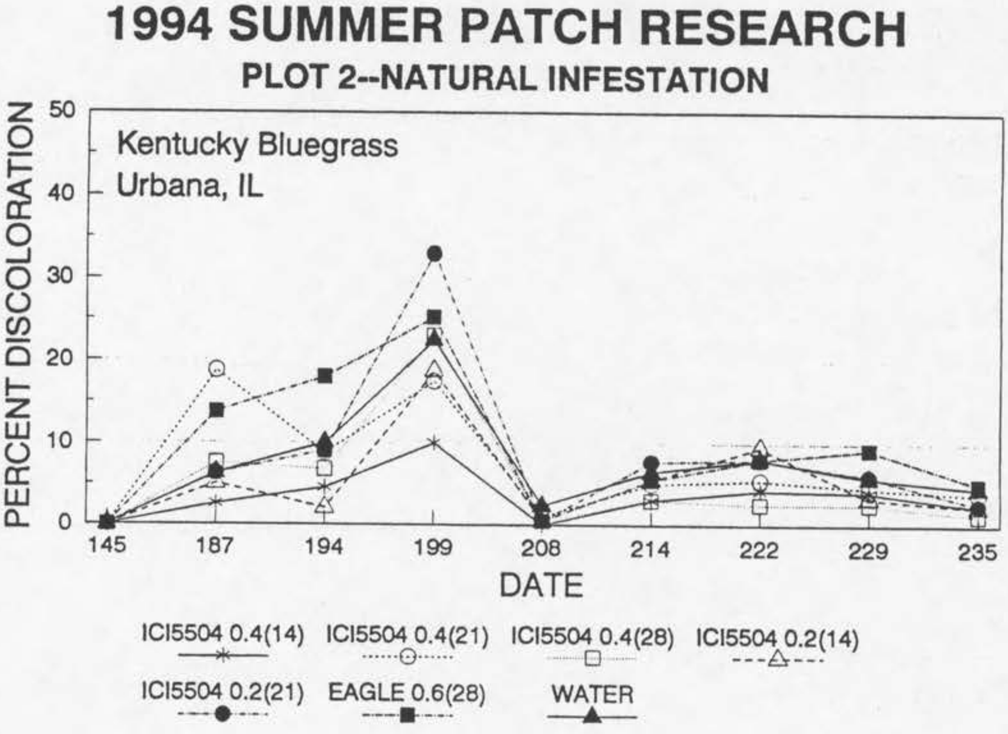



**Figure 3a.** Control of summer patch on bluegrass.

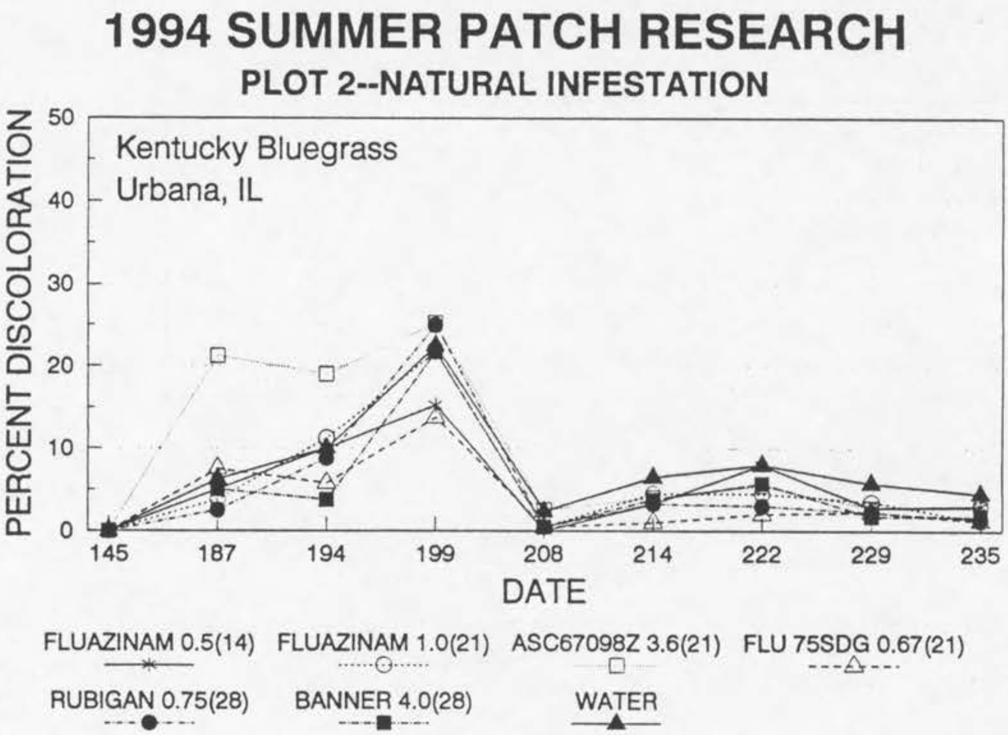



**Figure 3b.** Control of summer patch on bluegrass.

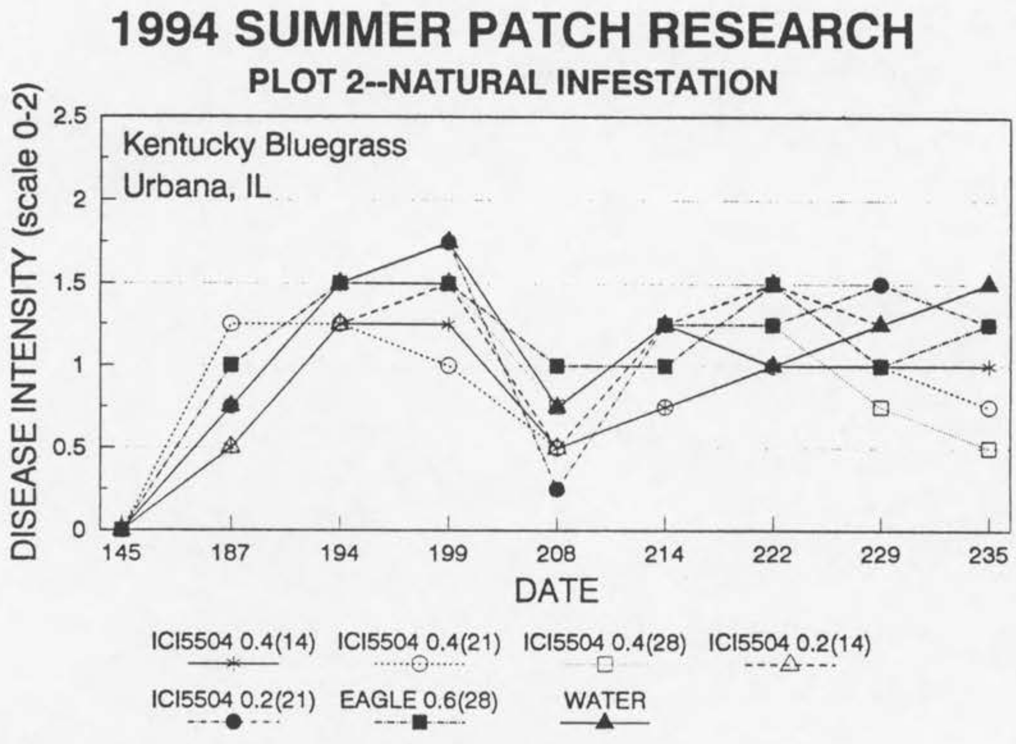



**Figure 3c.** Control of summer patch on bluegrass.

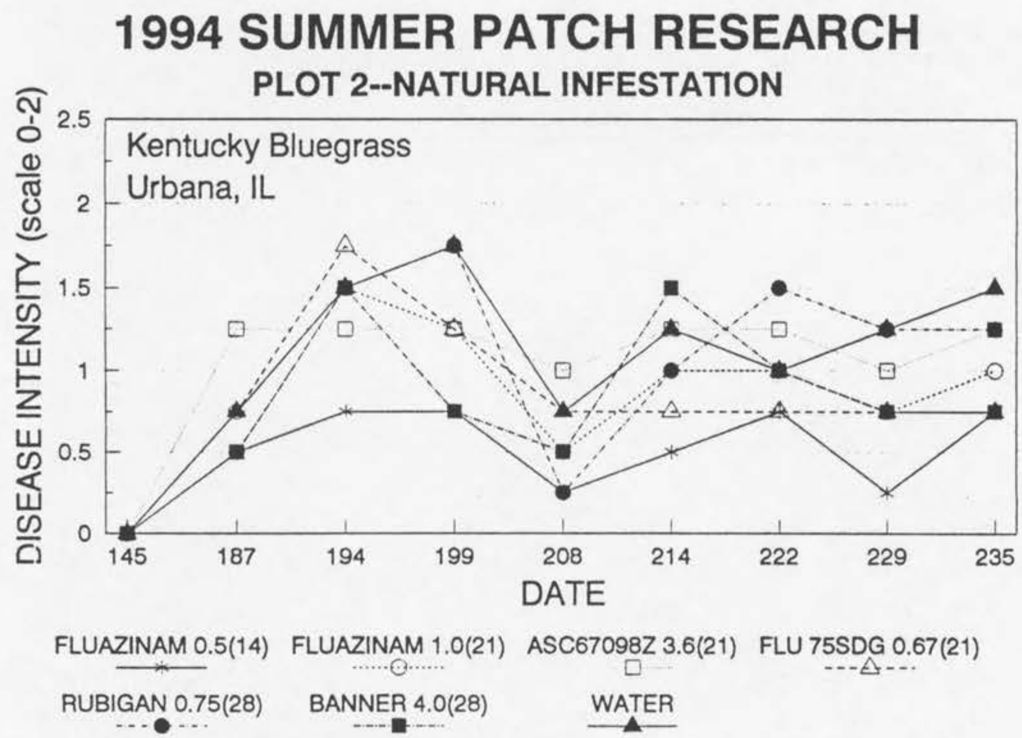



**Figure 3d.** Control of summer patch on bluegrass.

# *FUNGICIDE RESEARCH AT SOUTHERN ILLINOIS UNIVERSITY*

## Evaluation of Fungicides in 'Arid' Tall Fescue

*Kenneth L. Diesburg*

| | |
|---|---|
| **Research Protocol:** | **1994 Fungicide Trial** |
| **Location:** | Horticulture Research Center, Carbondale, IL, soil - Hosmer clay loam, pH 6.5. |
| **Site Preparation:** | three-year old turf; allow drought stress when warm; irrigate frequently after drought stress. |
| **Plot Maintenance:** | fertilizer - 4 lb N/M/yr, SCU and Nitroform; herbicides - Banner preemergent applied April 14, Trimec postemergent applied March 10; mowing height - 2.5 inches. |
| **Methods:** | $CO_2$ backpack sprayer with 5' boom; spray volume - 150 gpa; |
| **Experimental Design:** | RCB; 4 replications. |

May was dry, and irrigation was withheld until after a rain that occurred on June 2. First application of treatments occured on May 21. Assigned schedules were followed thereafter. Temperatures never dropped below 42°F after May 21. Day temperatures reached into the 80s for the first time on May 22. Treatments were applied, therefore, well in advance of disease symptoms. Turf quality ratings were taken on June 3 when the first indications of disease were observed. There were no significant differences among treatments at that time, regarding turf quality. Disease severity within the experiment decreased after July 16, and there were no further differences to be recorded. Final treatment occured on August 12.

**Table 1.** Percent brown patch in Arid tall fescue at Carbondale, Illinois 1994.

| Treatment | Interval wk | Rate oz/1000 | Percent Disease 7/4 | 7/16 | Average |
|---|---|---|---|---|---|
| EXP10622A 80WG | 2 | 4.00 | 38 | 41 | 39 |
| UTC | | | 30 | 46 | 38 |
| UTC | | | 23 | 46 | 34 |
| Sentinel 40WG | 6 | 0.25 | 22 | 44 | 33 |
| EXP10361A 60WG | 2 | 5.00 | 13 | 38 | 25 |
| Curalan | 3 | 2.30 | 24 | 22 | 23 |
| Sentinel 40WG | 6 | 0.33 | 17 | 26 | 22 |
| EXP10452A 50WG | 2 | 2.00 | 10 | 18 | 14 |
| Daconil 825 SDG | 2 | 3.80 | 13 | 12 | 13 |
| Daconil 2787 | 2 | 6.00 | 6 | 17 | 12 |
| Daconil 2787 4.17F | 2 | 6.00 | 10 | 10 | 10 |
| Sentinel 40WG | 4 | 0.25 | 9 | 10 | 10 |
| ProStar 50WP | 3 | 1.50 | 12 | 7 | 10 |
| Fluazinam 500F | 3 | 1.00 | 8 | 6 | 7 |
| Alliete/Fore | 2 | 2/4 | 5 | 8 | 7 |
| EXP10622A/Dithane | 2 | 4/8 | 5 | 8 | 6 |
| ProStar/Daconil | 3 | 1/4 | 5 | 7 | 6 |
| Chipco26019 WDG | 2 | 2.00 | 7 | 5 | 6 |
| EXP10452A 50WG | 2 | 1.50 | 5 | 6 | 6 |
| Sentinel 40WG | 4 | 0.33 | 4 | 6 | 5 |
| Alliet/Fore | 2 | 4/8 | 4 | 6 | 5 |
| EXP10621A 60WG | 2 | 8.00 | 6 | 4 | 5 |
| $LSD_{0.05}$ | | | 17 | 21 | 15 |

## *APPENDIX A*
## *ABBREVIATIONS*

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

# *APPENDIX B*
# *WEATHER INFORMATION FOR CHAMPAIGN, IL*

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | January 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 01/01/94 | 42 | 31 | 37 | 0.03 | 0.0 | 0 | R- | S | 13.8 | CLDY | 28 | 0 |
| 01/02/94 | 33 | 30 | 32 | 0.00 | 0.0 | 0 | F | E | 3.7 | CLDY | 33 | 0 |
| 01/03/94 | 31 | 28 | 30 | 0.00 | 0.0 | 0 | SW- | NE | 7.4 | CLDY | 35 | 0 |
| 01/04/94 | 32 | 22 | 27 | 0.00 | 0.0 | 0 | SW- | N | 10.9 | CLDY | 38 | 0 |
| 01/05/94 | 29 | 20 | 25 | 0.00 | 0.0 | 0 | | SE | 9.4 | CLDY | 40 | 0 |
| 01/06/94 | 38 | 28 | 33 | 0.00 | 0.0 | 0 | | SE | 6.1 | CLDY | 32 | 0 |
| 01/07/94 | 28 | 2 | 15 | 0.00 | 0.0 | 0 | SW- | NW | 10.6 | PC | 50 | 0 |
| 01/08/94 | 19 | 1 | 10 | 0.00 | 0.0 | 0 | | W | 8.9 | CLR | 55 | 0 |
| 01/09/94 | 27 | 4 | 16 | 0.00 | 0.0 | 0 | | SE | 4.6 | CLR | 49 | 0 |
| 01/10/94 | 35 | 21 | 28 | 0.10 | 1.0 | 0 | S,SW-,L- | SE | 11.0 | CLDY | 37 | 0 |
| 01/11/94 | 35 | 32 | 34 | 0.00 | 0.0 | 1 | | NE | 4.3 | CLDY | 31 | 0 |
| 01/12/94 | 35 | 30 | 33 | 0.00 | 0.0 | T | L-,F | W | 5.7 | CLDY | 32 | 0 |
| 01/13/94 | 30 | 8 | 19 | 0.02 | 0.3 | T | SW- | NW | 7.5 | CLDY | 46 | 0 |
| 01/14/94 | 8 | -6 | 1 | 0.00 | 0.0 | T | | NW | 10.5 | CLDY | 64 | 0 |
| 01/15/94 | -5 | -14 | -10 | 0.00 | 0.0 | T | | NW | 7.9 | CLR | 75 | 0 |
| 01/16/94 | 14 | -11 | 2 | 0.22 | 3.0 | T | S | SE | 10.3 | CLDY | 63 | 0 |
| 01/17/94 | 14 | -10 | 2 | 0.00 | 0.0 | 3 | SW- | NW | 10.0 | PC | 63 | 0 |
| 01/18/94 | -10 | -21 | -16 | 0.00 | 0.0 | 3 | | W | 9.5 | CLR | 81 | 0 |
| 01/19/94 | 2 | -25 | -12 | 0.03 | 1.0 | 3 | S | SE | 7.1 | CLDY | 77 | 0 |
| 01/20/94 | 11 | -10 | 1 | 0.00 | 0.0 | 4 | SW- | SE | 2.7 | CLR | 64 | 0 |
| 01/21/94 | 17 | -16 | 1 | 0.00 | 0.0 | 4 | | SW | 5.9 | PC | 64 | 0 |
| 01/22/94 | 32 | 5 | 19 | 0.00 | 0.0 | 4 | L-,F | S | 5.5 | CLDY | 46 | 0 |
| 01/23/94 | 37 | 29 | 33 | 0.00 | 0.0 | 4 | L-,F | SW | 9.6 | CLDY | 32 | 0 |
| 01/24/94 | 41 | 34 | 38 | 0.00 | 0.0 | T | F | SW | 4.9 | CLDY | 27 | 0 |
| 01/25/94 | 40 | 30 | 35 | 0.45 | 0.0 | T | R,R-,L,F | NE | 5.0 | CLDY | 30 | 0 |
| 01/26/94 | 30 | 24 | 27 | 0.00 | 0.0 | 0 | ZL | E | 10.2 | CLDY | 38 | 0 |
| 01/27/94 | 49 | 24 | 37 | 0.53 | 0.0 | 0 | ZL,ZR, R-,R,L,F | E | 6.5 | CLDY | 28 | 0 |
| 01/28/94 | 36 | 25 | 31 | 0.31 | 0.0 | 0 | R,R-,L, IP,SW- | W | 12.7 | CLDY | 34 | 0 |
| 01/29/94 | 32 | 23 | 28 | 0.03 | 0.5 | T | SW- | W | 4.0 | CLDY | 37 | 0 |
| 01/30/94 | 30 | 17 | 24 | 0.12 | 1.8 | | S | SE | 7.8 | CLDY | 41 | 0 |
| 01/31/94 | 17 | -4 | 7 | 0.00 | 0.0 | 2 | | WNW | 6.8 | PC | 58 | 0 |
| Total/ Average[5] | 26.1 | 11.3 | 18.7 | 1.84 | 7.6 | | | W | 7.8 | | 1,428 | 0 |
| Departure from Average | -5.6 | -4.7 | -5.2 | +0.01 | -0.5 | | | W | -0.5 | | +145 | +0 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | | | | Local Climatological Data<br>Illinois State Water Survey | | | | February 1994<br>Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Temperature Max. | Min. | Mean | Precip Inches | Snow[1] Inches | Depth | Weather Types[3] | Wind Dir. | Speed | Sky Cover[4] | Degree Days[2] Heat | Cool. |
| 02/01/94 | 16 | -7 | 5 | 0.00 | 0.0 | 2 | | SW | 4.0 | CLR | 60 | 0 |
| 02/02/94 | 29 | 14 | 22 | 0.00 | 0.0 | 2 | SW- | SW | 11.7 | CLDY | 43 | 0 |
| 02/03/94 | 26 | 5 | 16 | 0.00 | 0.0 | 2 | | SW | 7.4 | PC | 49 | 0 |
| 02/04/94 | 27 | 11 | 19 | 0.00 | 0.0 | 2 | | NNE | 4.8 | CLDY | 46 | 0 |
| 02/05/94 | 36 | 11 | 24 | 0.00 | 0.0 | 2 | | W | 4.8 | PC | 41 | 0 |
| 02/06/94 | 43 | 16 | 30 | 0.00 | 0.0 | 1 | | S | 8.2 | PC | 35 | 0 |
| 02/07/94 | 24 | 16 | 20 | 0.11 | 0.5 | T | IP,SG,ZL,<br>ZR | NE | 9.7 | CLDY | 45 | 0 |
| 02/08/94 | 18 | 12 | 15 | 0.09 | 0.1 | T | ZL,ZR,IP,<br>S- | NE | 8.9 | CLDY | 50 | 0 |
| 02/09/94 | 15 | 8 | 12 | 0.00 | 0.0 | T | | N | 8.5 | CLDY | 53 | 0 |
| 02/10/94 | 23 | 6 | 15 | 0.00 | 0.0 | T | | NE | 4.6 | PC | 50 | 0 |
| 02/11/94 | 28 | 11 | 20 | 0.00 | 0.0 | T | | NE | 7.0 | PC | 45 | 0 |
| 02/12/94 | 33 | 17 | 25 | 0.00 | 0.0 | T | ZL | E | 8.2 | CLDY | 40 | 0 |
| 02/13/94 | 35 | 17 | 26 | 0.00 | 0.0 | T | | NW | 8.7 | CLR | 39 | 0 |
| 02/14/94 | 47 | 24 | 36 | 0.00 | 0.0 | 0 | | SW | 11.4 | CLR | 29 | 0 |
| 02/15/94 | 42 | 28 | 35 | 0.00 | 0.0 | 0 | | NW | 6.3 | CLR | 30 | 0 |
| 02/16/94 | 45 | 23 | 34 | 0.00 | 0.0 | 0 | L-,F | SSE | 5.7 | PC | 31 | 0 |
| 02/17/94 | 56 | 32 | 44 | 0.00 | 0.0 | 0 | | SSE | 6.2 | PC | 21 | 0 |
| 02/18/94 | 59 | 32 | 46 | 0.00 | 0.0 | 0 | | SE | 7.9 | PC | 19 | 0 |
| 02/19/94 | 63 | 46 | 55 | 0.01 | 0.0 | 0 | R-,L | S | 14.9 | PC | 10 | 0 |
| 02/20/94 | 56 | 35 | 46 | 0.05 | 0.0 | 0 | R-,L | NW | 9.4 | CLDY | 19 | 0 |
| 02/21/94 | 38 | 28 | 33 | 0.00 | 0.0 | 0 | | N | 6.5 | CLDY | 32 | 0 |
| 02/22/94 | 32 | 28 | 30 | 0.14 | 0.0 | 0 | ZL,ZR,IP,<br>SW- | NE | 11.1 | CLDY | 35 | 0 |
| 02/23/94 | 30 | 20 | 25 | 0.26 | 1.0 | T | S,ZL,IP | W | 4.9 | CLDY | 40 | 0 |
| 02/24/94 | 21 | 12 | 17 | 0.06 | 0.4 | 1 | SW-,S- | W | 5.4 | PC | 48 | 0 |
| 02/25/94 | 31 | 10 | 21 | 0.20 | 3.3 | 1 | SW | W | 13.0 | CLDY | 44 | 0 |
| 02/26/94 | 21 | 7 | 14 | 0.00 | 0.0 | 3 | | N | 6.9 | CLR | 51 | 0 |
| 02/27/94 | 25 | 6 | 16 | 0.00 | 0.0 | 3 | | ESE | 3.8 | PC | 49 | 0 |
| 02/28/94 | 34 | 18 | 26 | 0.06 | 0.6 | 3 | S | E | 3.2 | CLDY | 39 | 0 |
| Total/ Average[5] | 34.0 | 17.4 | 25.7 | 0.98 | 5.9 | | | NE | 7.6 | | 1,093 | 0 |
| Departure from Average | -2.3 | -2.9 | -2.6 | -0.99 | -1.1 | | | S | -0.4 | | +51 | +0 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | | | | Local Climatological Data<br>Illinois State Water Survey | | | | March 1994<br>Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 03/01/94 | 34 | 28 | 31 | 0.15 | 1.5 | 5 | S | NE | 7.8 | CLDY | 34 | 0 |
| 03/02/94 | 34 | 20 | 27 | 0.00 | 0.0 | 4 | | N | 11.6 | CLR | 38 | 0 |
| 03/03/94 | 46 | 17 | 32 | 0.00 | 0.0 | 4 | F | W | 6.8 | CLR | 33 | 0 |
| 03/04/94 | 48 | 33 | 41 | 0.00 | 0.0 | 3 | F | NW | 7.9 | CLR | 24 | 0 |
| 03/05/94 | 57 | 28 | 43 | 0.00 | 0.0 | T | F | S | 5.1 | CLR | 22 | 0 |
| 03/06/94 | 62 | 40 | 51 | 0.00 | 0.0 | T | R-,L,F | N | 6.1 | CLDY | 14 | 0 |
| 03/07/94 | 46 | 36 | 41 | 0.48 | 0.0 | 0 | TRW-, R,L | NW | 6.6 | CLDY | 24 | 0 |
| 03/08/94 | 36 | 27 | 32 | 0.00 | 0.0 | 0 | | NW | 6.6 | CLDY | 33 | 0 |
| 03/09/94 | 34 | 25 | 30 | 0.00 | 0.0 | 0 | | N | 8.2 | PC | 35 | 0 |
| 03/10/94 | 42 | 22 | 32 | 0.00 | 0.0 | 0 | SW- | NW | 4.6 | PC | 33 | 0 |
| 03/11/94 | 46 | 24 | 35 | 0.00 | 0.0 | 0 | F | SE | 3.4 | CLR | 30 | 0 |
| 03/12/94 | 61 | 29 | 45 | 0.00 | 0.0 | 0 | | SW | 9.6 | CLDY | 20 | 0 |
| 03/13/94 | 52 | 33 | 43 | 0.09 | 0.0 | 0 | R,R-,L | NW | 6.4 | CLDY | 22 | 0 |
| 03/14/94 | 54 | 27 | 41 | 0.00 | 0.0 | 0 | RW-,F | SSW | 8.2 | PC | 24 | 0 |
| 03/15/94 | 53 | 30 | 42 | 0.00 | 0.0 | 0 | RW- | NW | 11.0 | PC | 23 | 0 |
| 03/16/94 | 39 | 25 | 32 | 0.00 | 0.0 | 0 | | N | 8.4 | PC | 33 | 0 |
| 03/17/94 | 39 | 21 | 30 | 0.00 | 0.0 | 0 | | SE | 10.3 | CLDY | 35 | 0 |
| 03/18/94 | 54 | 28 | 41 | 0.00 | 0.0 | 0 | | NW | 10.3 | CLR | 24 | 0 |
| 03/19/94 | 48 | 24 | 36 | 0.00 | 0.0 | 0 | | S | 4.7 | PC | 29 | 0 |
| 03/20/94 | 63 | 40 | 52 | 0.00 | 0.0 | 0 | | SE | 9.3 | CLDY | 13 | 0 |
| 03/21/94 | 58 | 30 | 44 | 0.00 | 0.0 | 0 | TRW-,F | NW | 9.1 | CLDY | 21 | 0 |
| 03/22/94 | 71 | 28 | 50 | 0.00 | 0.0 | 0 | SW- | SW | 14.8 | PC | 15 | 0 |
| 03/23/94 | 77 | 37 | 57 | 0.00 | 0.0 | 0 | TRW- | S | 15.9 | PC | 8 | 0 |
| 03/24/94 | 62 | 34 | 48 | 0.00 | 0.0 | 0 | | NW | 10.7 | PC | 17 | 0 |
| 03/25/94 | 49 | 29 | 39 | 0.00 | 0.0 | 0 | | N | 5.4 | PC | 26 | 0 |
| 03/26/94 | 46 | 38 | 42 | 0.35 | 0.0 | 0 | R,L | SE | 8.1 | CLDY | 23 | 0 |
| 03/27/94 | 47 | 37 | 42 | 0.03 | 0.0 | 0 | R,L | NW | 5.1 | CLDY | 23 | 0 |
| 03/28/94 | 46 | 31 | 39 | 0.00 | 0.0 | 0 | R-,SW-, IP- | W | 6.8 | CLDY | 26 | 0 |
| 03/29/94 | 45 | 30 | 38 | 0.00 | 0.0 | 0 | | NW | 6.2 | PC | 27 | 0 |
| 03/30/94 | 47 | 26 | 37 | 0.00 | 0.0 | 0 | | W | 5.1 | PC | 28 | 0 |
| 03/31/94 | 52 | 26 | 39 | 0.00 | 0.0 | 0 | | W | 6.5 | PC | 26 | 0 |
| Total/ Average[5] | 49.9 | 29.1 | 39.5 | 1.10 | 1.5 | | | NW | 8.0 | | 783 | 0 |
| Departure from Average | +1.1 | -2.0 | -0.4 | -2.20 | -2.6 | | | S | -0.6 | | -2 | -1 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | April 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 04/01/94 | 69 | 32 | 51 | 0.00 | 0.0 | 0 | | SW | 8.5 | CLR | 14 | 0 |
| 04/02/94 | 72 | 37 | 55 | 0.32 | 0.0 | 0 | R,L | W | 9.0 | CLDY | 10 | 0 |
| 04/03/94 | 49 | 34 | 42 | 0.23 | 0.0 | 0 | R,L | N | 7.5 | PC | 23 | 0 |
| 04/04/94 | 57 | 28 | 43 | 0.00 | 0.0 | 0 | | S | 12.4 | PC | 22 | 0 |
| 04/05/94 | 51 | 30 | 41 | 0.37 | 0.8 | 0 | R,L,ZR,IP,S | N | 11.2 | CLDY | 24 | 0 |
| 04/06/94 | 34 | 22 | 28 | 0.14 | 1.7 | 1 | S | N | 7.0 | CLDY | 37 | 0 |
| 04/07/94 | 45 | 16 | 31 | 0.00 | 0.0 | 2 | F | SE | 2.1 | PC | 34 | 0 |
| 04/08/94 | 62 | 31 | 47 | 0.00 | 0.0 | 0 | | S | 11.5 | CLDY | 18 | 0 |
| 04/09/94 | 62 | 44 | 53 | 0.61 | 0.0 | 0 | R,R-,L | SW | 6.7 | CLDY | 12 | 0 |
| 04/10/94 | 56 | 42 | 49 | 0.41 | 0.0 | 0 | R,L | NE | 9.0 | CLDY | 16 | 0 |
| 04/11/94 | 44 | 41 | 43 | 2.96 | 0.0 | 0 | TRW+,TRW,R,L | NE | 6.9 | CLDY | 22 | 0 |
| 04/12/94 | 69 | 44 | 57 | 0.92 | 0.0 | 0 | TRW,R-,RW-,L | W | 10.2 | CLDY | 8 | 0 |
| 04/13/94 | 48 | 38 | 43 | 0.00 | 0.0 | 0 | L | SW | 9.6 | CLDY | 22 | 0 |
| 04/14/94 | 77 | 38 | 58 | 0.00 | 0.0 | 0 | L,F | S | 10.2 | CLR | 7 | 0 |
| 04/15/94 | 64 | 45 | 55 | 0.58 | 0.0 | 0 | TRW+,TRW-,RW- | W | 13.8 | PC | 10 | 0 |
| 04/16/94 | 64 | 41 | 53 | 0.00 | 0.0 | 0 | | W | 11.2 | CLR | 12 | 0 |
| 04/17/94 | 69 | 42 | 56 | 0.00 | 0.0 | 0 | | W | 7.8 | CLR | 9 | 0 |
| 04/18/94 | 80 | 50 | 65 | 0.00 | 0.0 | 0 | L | SW | 12.2 | CLR | 0 | 0 |
| 04/19/94 | 71 | 54 | 63 | 0.00 | 0.0 | 0 | | NW | 8.4 | CLR | 2 | 0 |
| 04/20/94 | 67 | 46 | 57 | 0.08 | 0.0 | 0 | R | N | 5.8 | CLR | 8 | 0 |
| 04/21/94 | 54 | 42 | 48 | 0.02 | 0.0 | 0 | R-,L | NE | 4.5 | CLDY | 17 | 0 |
| 04/22/94 | 62 | 38 | 50 | 0.00 | 0.0 | 0 | | NE | 6.5 | CLR | 15 | 0 |
| 04/23/94 | 68 | 38 | 53 | 0.00 | 0.0 | 0 | | S | 7.4 | CLR | 12 | 0 |
| 04/24/94 | 81 | 47 | 64 | 0.00 | 0.0 | 0 | | SW | 11.7 | CLR | 1 | 0 |
| 04/25/94 | 82 | 58 | 70 | 0.00 | 0.0 | 0 | TRW-,F | S | 14.4 | PC | 0 | 5 |
| 04/26/94 | 83 | 62 | 73 | 0.83 | 0.0 | 0 | TRW+,L,A | S | 17.4 | CLDY | 0 | 8 |
| 04/27/94 | 67 | 44 | 56 | 0.04 | 0.0 | 0 | RW | NW | 7.3 | CLDY | 9 | 0 |
| 04/28/94 | 66 | 43 | 55 | 1.10 | 0.0 | 0 | TRW,R,L | NE | 10.2 | CLDY | 10 | 0 |
| 04/29/94 | 55 | 43 | 49 | 0.00 | 0.0 | 0 | | W | 6.1 | CLDY | 16 | 0 |
| 04/30/94 | 45 | 36 | 41 | 0.66 | 0.0 | 0 | R,R-,L | NE | 7.8 | CLDY | 24 | 0 |
| Total/ Average[5] | 62.4 | 40.2 | 51.3 | 9.27 | 2.5 | | | SW | 9.1 | | 414 | 13 |
| Departure from Average | +0.0 | -1.2 | -0.6 | +5.33 | +1.5 | | | S | +0.6 | | +3 | +3 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | May 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 05/01/94 | 53 | 36 | 45 | 0.00 | 0.0 | 0 | | NW | 5.2 | CLDY | 20 | 0 |
| 05/02/94 | 59 | 35 | 47 | 0.00 | 0.0 | 0 | L | E | 2.7 | PC | 18 | 0 |
| 05/03/94 | 64 | 42 | 53 | 0.00 | 0.0 | 0 | | E | 4.0 | CLDY | 12 | 0 |
| 05/04/94 | 67 | 40 | 54 | 0.00 | 0.0 | 0 | F | W | 2.6 | PC | 11 | 0 |
| 05/05/94 | 75 | 50 | 63 | 0.20 | 0.0 | 0 | R,L,F | W | 7.0 | PC | 2 | 0 |
| 05/06/94 | 51 | 44 | 48 | 0.75 | 0.0 | 0 | R,L | NE | 4.4 | CLDY | 17 | 0 |
| 05/07/94 | 53 | 40 | 47 | 0.71 | 0.0 | 0 | TRW+,R,L | N | 7.4 | CLDY | 18 | 0 |
| 05/08/94 | 66 | 38 | 52 | 0.00 | 0.0 | 0 | | SW | 5.0 | PC | 13 | 0 |
| 05/09/94 | 72 | 46 | 59 | 0.00 | 0.0 | 0 | | NW | 5.6 | PC | 6 | 0 |
| 05/10/94 | 72 | 44 | 58 | 0.00 | 0.0 | 0 | | W | 4.3 | CLR | 7 | 0 |
| 05/11/94 | 80 | 54 | 67 | 0.47 | 0.0 | 0 | TRW+, RW+,R,L | SW | 11.9 | CLDY | 0 | 2 |
| 05/12/94 | 70 | 47 | 59 | 0.00 | 0.0 | 0 | | NE | 2.7 | CLR | 6 | 0 |
| 05/13/94 | 73 | 44 | 59 | 0.00 | 0.0 | 0 | | SE | 4.1 | PC | 6 | 0 |
| 05/14/94 | 69 | 51 | 60 | 0.15 | 0.0 | 0 | RW,R,L,F | SE | 6.5 | CLDY | 5 | 0 |
| 05/15/94 | 76 | 54 | 65 | 0.00 | 0.0 | 0 | | NW | 6.5 | CLR | 0 | 0 |
| 05/16/94 | 71 | 46 | 59 | 0.00 | 0.0 | 0 | | N | 6.6 | CLR | 6 | 0 |
| 05/17/94 | 71 | 41 | 56 | 0.00 | 0.0 | 0 | | NE | 7.5 | CLR | 9 | 0 |
| 05/18/94 | 73 | 42 | 58 | 0.00 | 0.0 | 0 | | NE | 8.0 | CLR | 7 | 0 |
| 05/19/94 | 74 | 45 | 60 | 0.00 | 0.0 | 0 | | NE | 5.4 | CLR | 5 | 0 |
| 05/20/94 | 78 | 47 | 63 | 0.00 | 0.0 | 0 | | NE | 2.4 | CLR | 2 | 0 |
| 05/21/94 | 83 | 50 | 67 | 0.00 | 0.0 | 0 | | NW | 2.6 | CLR | 0 | 2 |
| 05/22/94 | 86 | 60 | 73 | 0.00 | 0.0 | 0 | | W | 4.3 | CLR | 0 | 8 |
| 05/23/94 | 88 | 60 | 74 | 0.00 | 0.0 | 0 | | W | 4.5 | PC | 0 | 9 |
| 05/24/94 | 88 | 62 | 75 | 1.54 | 0.0 | 0 | TRW+,A,R W+,R,L | W | 7.7 | CLDY | 0 | 10 |
| 05/25/94 | 79 | 59 | 69 | 0.10 | 0.0 | 0 | TRW,R,L,F | W | 6.9 | PC | 0 | 4 |
| 05/26/94 | 64 | 44 | 54 | 0.00 | 0.0 | 0 | L | N | 6.5 | CLDY | 11 | 0 |
| 05/27/94 | 68 | 41 | 55 | 0.00 | 0.0 | 0 | | N | 4.1 | CLR | 10 | 0 |
| 05/28/94 | 76 | 44 | 60 | 0.00 | 0.0 | 0 | | SW | 4.4 | CLR | 5 | 0 |
| 05/29/94 | 80 | 49 | 65 | 0.00 | 0.0 | 0 | | S | 7.0 | CLR | 0 | 0 |
| 05/30/94 | 85 | 60 | 73 | 0.09 | 0.0 | 0 | RW | S | 7.3 | PC | 0 | 8 |
| 05/31/94 | 85 | 65 | 75 | 0.00 | 0.0 | 0 | F | W | 7.8 | PC | 0 | 10 |
| Total/ Average[5] | 72.5 | 47.7 | 60.1 | 4.01 | 0.0 | | | W | 5.6 | | 196 | 53 |
| Departure from Average | -1.2 | -4.0 | -2.6 | +0.04 | +0.0 | | | S | -1.3 | | +46 | -18 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | | | | Local Climatological Data<br>Illinois State Water Survey | | | | June 1994<br>Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 06/01/94 | 80 | 56 | 68 | 0.00 | 0.0 | 0 | L | NW | 4.9 | PC | 0 | 3 |
| 06/02/94 | 66 | 51 | 59 | 0.10 | 0.0 | 0 | R-,L | NE | 3.3 | PC | 6 | 0 |
| 06/03/94 | 77 | 53 | 65 | 0.00 | 0.0 | 0 | | NE | 2.7 | PC | 0 | 0 |
| 06/04/94 | 84 | 55 | 70 | 0.00 | 0.0 | 0 | | NE | 2.3 | CLR | 0 | 5 |
| 06/05/94 | 86 | 56 | 71 | 0.00 | 0.0 | 0 | T,H | SW | 6.7 | PC | 0 | 6 |
| 06/06/94 | 92 | 66 | 79 | 0.00 | 0.0 | 0 | | NW | 3.8 | CLR | 0 | 14 |
| 06/07/94 | 93 | 64 | 79 | 0.00 | 0.0 | 0 | H | NE | 4.2 | PC | 0 | 14 |
| 06/08/94 | 64 | 55 | 60 | 0.37 | 0.0 | 0 | TRW,RW-,<br>L | NE | 7.7 | CLDY | 5 | 0 |
| 06/09/94 | 74 | 57 | 66 | 0.00 | 0.0 | 0 | | NE | 4.3 | CLDY | 0 | 1 |
| 06/10/94 | 80 | 58 | 69 | 0.00 | 0.0 | 0 | | NNW | 3.8 | PC | 0 | 4 |
| 06/11/94 | 81 | 56 | 69 | 0.00 | 0.0 | 0 | | W | 4.1 | PC | 0 | 4 |
| 06/12/94 | 87 | 62 | 75 | 0.16 | 0.0 | 0 | TRW,RW,<br>RW-,L | W | 5.7 | CLDY | 0 | 10 |
| 06/13/94 | 89 | 68 | 79 | 0.00 | 0.0 | 0 | F | SSW | 11.0 | CLDY | 0 | 14 |
| 06/14/94 | 93 | 72 | 83 | 0.00 | 0.0 | 0 | F | S | 9.1 | CLDY | 0 | 18 |
| 06/15/94 | 94 | 70 | 82 | 0.00 | 0.0 | 0 | | SSW | 7.2 | PC | 0 | 17 |
| 06/16/94 | 94 | 70 | 82 | 0.00 | 0.0 | 0 | F,H | SW | 2.8 | PC | 0 | 17 |
| 06/17/94 | 94 | 69 | 82 | 0.00 | 0.0 | 0 | F | E | 1.6 | CLR | 0 | 17 |
| 06/18/94 | 96 | 74 | 85 | 0.00 | 0.0 | 0 | | NE | 1.9 | PC | 0 | 20 |
| 06/19/94 | 96 | 76 | 86 | 0.22 | 0.0 | 0 | TRW | NE | 3.0 | CLDY | 0 | 21 |
| 06/20/94 | 93 | 73 | 83 | 0.00 | 0.0 | 0 | F,H | NNE | 3.4 | PC | 0 | 18 |
| 06/21/94 | 92 | 73 | 83 | 0.00 | 0.0 | 0 | | NW | 4.5 | CLDY | 0 | 18 |
| 06/22/94 | 90 | 66 | 78 | 0.00 | 0.0 | 0 | | NE | 2.2 | PC | 0 | 13 |
| 06/23/94 | 92 | 70 | 81 | 0.71 | 0.0 | 0 | F,TRW+,<br>R,RW- | S | 7.1 | CLDY | 0 | 16 |
| 06/24/94 | 74 | 61 | 68 | 0.11 | 0.0 | 0 | R,L | N | 7.5 | CLDY | 0 | 3 |
| 06/25/94 | 83 | 56 | 70 | 0.00 | 0.0 | 0 | TRW- | W | 5.0 | CLDY | 0 | 5 |
| 06/26/94 | 76 | 64 | 70 | 0.21 | 0.0 | 0 | TRW,<br>TRW- | N | 3.9 | CLDY | 0 | 5 |
| 06/27/94 | 81 | 62 | 72 | 0.00 | 0.0 | 0 | F | N | 3.1 | PC | 0 | 7 |
| 06/28/94 | 88 | 67 | 78 | 0.00 | 0.0 | 0 | | W | 6.8 | PC | 0 | 13 |
| 06/29/94 | 81 | 64 | 73 | 0.11 | 0.0 | 0 | R | W | 7.5 | PC | 0 | 8 |
| 06/30/94 | 84 | 62 | 73 | 0.00 | 0.0 | 0 | | S | 2.9 | PC | 0 | 8 |
| Total/<br>Average[5] | 85.1 | 63.5 | 74.3 | 1.99 | 0.0 | | | NE | 4.8 | | 11 | 299 |
| Departure from Average | +2.2 | +2.7 | +2.4 | -2.08 | +0.0 | | | SW | -1.2 | | -5 | +85 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | | | | Local Climatological Data<br>Illinois State Water Survey | | | July 1994<br>Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 07/01/94 | 89 | 63 | 76 | 0.00 | 0.0 | 0 | | SW | 5.2 | CLR | 0 | 11 |
| 07/02/94 | 81 | 65 | 73 | 0.02 | 0.0 | 0 | R | NE | 5.3 | CLDY | 0 | 8 |
| 07/03/94 | 86 | 63 | 75 | 0.14 | 0.0 | 0 | R | SE | 4.3 | PC | 0 | 10 |
| 07/04/94 | 91 | 70 | 81 | 0.00 | 0.0 | 0 | | S | 8.2 | CLR | 0 | 16 |
| 07/05/94 | 94 | 72 | 83 | 0.00 | 0.0 | 0 | | SW | 5.7 | PC | 0 | 18 |
| 07/06/94 | 93 | 69 | 81 | 0.00 | 0.0 | 0 | TRW-,F | S | 4.1 | CLDY | 0 | 16 |
| 07/07/94 | 90 | 69 | 80 | 0.00 | 0.0 | 0 | F | S | 6.1 | CLDY | 0 | 15 |
| 07/08/94 | 85 | 60 | 73 | 0.00 | 0.0 | 0 | R-,F | S | 7.8 | CLDY | 0 | 8 |
| 07/09/94 | 81 | 59 | 70 | 0.00 | 0.0 | 0 | | W | 7.3 | CLR | 0 | 5 |
| 07/10/94 | 79 | 57 | 68 | 0.00 | 0.0 | 0 | | NE | 3.5 | PC | 0 | 3 |
| 07/11/94 | 84 | 55 | 70 | 0.00 | 0.0 | 0 | | S | 2.8 | CLR | 0 | 5 |
| 07/12/94 | 89 | 62 | 76 | 0.00 | 0.0 | 0 | | S | 3.3 | CLR | 0 | 11 |
| 07/13/94 | 88 | 64 | 76 | 0.05 | 0.0 | 0 | TRW,F | SE | 3.0 | CLDY | 0 | 11 |
| 07/14/94 | 90 | 70 | 80 | 0.00 | 0.0 | 0 | F | SW | 4.6 | CLDY | 0 | 15 |
| 07/15/94 | 83 | 62 | 73 | 0.00 | 0.0 | 0 | | NNW | 3.5 | PC | 0 | 8 |
| 07/16/94 | 85 | 60 | 73 | 0.03 | 0.0 | 0 | RW | SE | 3.0 | PC | 0 | 8 |
| 07/17/94 | 84 | 65 | 75 | 0.00 | 0.0 | 0 | R-,F | W | 4.7 | CLDY | 0 | 10 |
| 07/18/94 | 88 | 61 | 75 | 0.00 | 0.0 | 0 | F | SE | 2.9 | CLR | 0 | 10 |
| 07/19/94 | 89 | 66 | 78 | 0.07 | 0.0 | 0 | TRW-, TRW,F | S | 5.8 | PC | 0 | 13 |
| 07/20/94 | 94 | 70 | 82 | 0.91 | 0.0 | 0 | TRW+,TRW,R,L,F | SW | 6.4 | CLDY | 0 | 17 |
| 07/21/94 | 83 | 68 | 76 | 0.05 | 0.0 | 0 | RW-,F | SW | 5.3 | CLDY | 0 | 11 |
| 07/22/94 | 82 | 66 | 74 | 0.00 | 0.0 | 0 | | W | 6.8 | PC | 0 | 9 |
| 07/23/94 | 85 | 64 | 75 | 0.00 | 0.0 | 0 | | W | 4.4 | PC | 0 | 10 |
| 07/24/94 | 85 | 64 | 75 | 0.00 | 0.0 | 0 | TRW- | W | 4.7 | CLDY | 0 | 10 |
| 07/25/94 | 82 | 62 | 72 | 0.01 | 0.0 | 0 | R-,L | W | 4.1 | PC | 0 | 7 |
| 07/26/94 | 79 | 63 | 71 | 0.00 | 0.0 | 0 | | NW | 4.0 | PC | 0 | 6 |
| 07/27/94 | 76 | 61 | 69 | 0.00 | 0.0 | 0 | RW-,L | N | 4.2 | PC | 0 | 4 |
| 07/28/94 | 80 | 58 | 69 | 0.00 | 0.0 | 0 | | N | 4.6 | CLR | 0 | 4 |
| 07/29/94 | 80 | 54 | 67 | 0.00 | 0.0 | 0 | | N | 2.1 | PC | 0 | 2 |
| 07/30/94 | 83 | 56 | 70 | 0.00 | 0.0 | 0 | | S | 2.5 | PC | 0 | 5 |
| 07/31/94 | 85 | 58 | 72 | 0.00 | 0.0 | 0 | | S | 4.8 | CLR | 0 | 7 |
| Total/ Average[5] | 85.3 | 63.1 | 74.2 | 1.28 | 0.0 | | | S | 4.7 | | 0 | 293 |
| Departure from Average | +0.0 | -1.7 | -0.9 | -3.20 | +0.0 | | | SW | -0.2 | | -2 | -12 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | August 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 08/01/94 | 88 | 58 | 73 | 0.00 | 0.0 | 0 | F | SW | 4.6 | PC | 0 | 8 |
| 08/02/94 | 86 | 67 | 77 | 0.11 | 0.0 | 0 | TRW,L | E | 2.4 | CLDY | 0 | 12 |
| 08/03/94 | 90 | 62 | 76 | 0.32 | 0.0 | 0 | TRW,F | SW | 4.2 | CLDY | 0 | 11 |
| 08/04/94 | 81 | 62 | 72 | 0.02 | 0.0 | 0 | RW-,F | W | 7.4 | CLDY | 0 | 7 |
| 08/05/94 | 72 | 53 | 63 | 0.00 | 0.0 | 0 | | NE | 6.9 | CLR | 2 | 0 |
| 08/06/94 | 73 | 50 | 62 | 0.00 | 0.0 | 0 | | SE | 3.1 | PC | 3 | 0 |
| 08/07/94 | 81 | 52 | 67 | 0.00 | 0.0 | 0 | | S | 3.1 | PC | 0 | 2 |
| 08/08/94 | 90 | 61 | 76 | 0.17 | 0.0 | 0 | TRW+,TRW,A,F | SW | 4.7 | CLDY | 0 | 11 |
| 08/09/94 | 75 | 55 | 65 | 0.00 | 0.0 | 0 | | NE | 5.7 | PC | 0 | 0 |
| 08/10/94 | 72 | 55 | 64 | 0.00 | 0.0 | 0 | | SE | 3.8 | CLDY | 1 | 0 |
| 08/11/94 | 82 | 65 | 74 | 0.02 | 0.0 | 0 | RW-,L,F | NW | 5.8 | CLDY | 0 | 9 |
| 08/12/94 | 83 | 63 | 73 | 0.03 | 0.0 | 0 | TRW-,L,F | S | 3.1 | CLDY | 0 | 8 |
| 08/13/94 | 92 | 72 | 82 | 0.78 | 0.0 | 0 | TRW+,TRW,R,F | SW | 7.4 | CLDY | 0 | 17 |
| 08/14/94 | 74 | 56 | 65 | 0.00 | 0.0 | 0 | | N | 5.2 | CLR | 0 | 0 |
| 08/15/94 | 76 | 55 | 66 | 0.00 | 0.0 | 0 | | N | 1.5 | CLR | 0 | 1 |
| 08/16/94 | 80 | 56 | 68 | 0.00 | 0.0 | 0 | F | SE | 1.5 | CLR | 0 | 3 |
| 08/17/94 | 83 | 59 | 71 | 0.00 | 0.0 | 0 | F | NE | 1.7 | CLR | 0 | 6 |
| 08/18/94 | 85 | 60 | 73 | 0.00 | 0.0 | 0 | F | S | 2.4 | PC | 0 | 8 |
| 08/19/94 | 89 | 62 | 76 | 0.00 | 0.0 | 0 | F | S | 6.5 | CLR | 0 | 11 |
| 08/20/94 | 79 | 64 | 72 | 0.63 | 0.0 | 0 | TRW,RW,R,L,F | W | 4.7 | CLDY | 0 | 7 |
| 08/21/94 | 77 | 60 | 69 | 0.00 | 0.0 | 0 | | N | 4.3 | CLDY | 0 | 4 |
| 08/22/94 | 79 | 56 | 68 | 0.00 | 0.0 | 0 | F | SE | 1.4 | PC | 0 | 3 |
| 08/23/94 | 81 | 59 | 70 | 0.00 | 0.0 | 0 | F | S | 3.4 | PC | 0 | 5 |
| 08/24/94 | 85 | 61 | 73 | 0.00 | 0.0 | 0 | F | SW | 4.7 | PC | 0 | 8 |
| 08/25/94 | 88 | 63 | 76 | 0.00 | 0.0 | 0 | F | SW | 4.3 | PC | 0 | 11 |
| 08/26/94 | 81 | 66 | 74 | 0.17 | 0.0 | 0 | TRW,F | SW | 3.9 | CLDY | 0 | 9 |
| 08/27/94 | 89 | 62 | 76 | 0.00 | 0.0 | 0 | F | SW | 5.1 | CLR | 0 | 11 |
| 08/28/94 | 85 | 60 | 73 | 0.53 | 0.0 | 0 | TRW+,RW,R,L | SW | 5.9 | CLDY | 0 | 8 |
| 08/29/94 | 80 | 53 | 67 | 0.00 | 0.0 | 0 | F | N | 1.4 | PC | 0 | 2 |
| 08/30/94 | 71 | 55 | 63 | 0.54 | 0.0 | 0 | TRW,F | SSE | 3.8 | CLDY | 2 | 0 |
| 08/31/94 | 71 | 59 | 65 | 0.33 | 0.0 | 0 | TRW+,RW,F | N | 4.7 | CLDY | 0 | 0 |
| Total/ Average[5] | 81.2 | 59.4 | 70.3 | 3.65 | 0.0 | | | SW | 4.1 | | 8 | 182 |
| Departure from Average | -1.8 | -3.0 | -2.4 | -0.37 | +0.0 | | | SW | -0.6 | | +1 | -56 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | Local Climatological Data<br>Illinois State Water Survey | September 1994<br>Summary |
|---|---|---|

| Date | Temperature Max. | Min. | Mean | Precip Inches | Snow[1] Inches | Depth | Weather Types[3] | Wind Dir. | Speed | Sky Cover[4] | Degree Days[2] Heat | Cool. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09/01/94 | 67 | 52 | 60 | 0.00 | 0.0 | 0 | | NE | 4.6 | CLDY | 5 | 0 |
| 09/02/94 | 72 | 49 | 61 | 0.00 | 0.0 | 0 | | E | 2.5 | CLR | 4 | 0 |
| 09/03/94 | 73 | 53 | 63 | 0.00 | 0.0 | 0 | | E | 2.2 | PC | 2 | 0 |
| 09/04/94 | 66 | 52 | 59 | 0.16 | 0.0 | 0 | R,RW,L | SE | 4.0 | CLDY | 6 | 0 |
| 09/05/94 | 67 | 58 | 63 | 0.43 | 0.0 | 0 | R,RW,L,F | SE | 3.2 | CLDY | 2 | 0 |
| 09/06/94 | 77 | 58 | 68 | 0.00 | 0.0 | 0 | F | NW | 3.6 | PC | 0 | 3 |
| 09/07/94 | 77 | 53 | 65 | 0.00 | 0.0 | 0 | | W | 1.9 | CLR | 0 | 0 |
| 09/08/94 | 81 | 49 | 65 | 0.00 | 0.0 | 0 | | SW | 1.6 | CLR | 0 | 0 |
| 09/09/94 | 85 | 58 | 72 | 0.00 | 0.0 | 0 | F | W | 3.6 | PC | 0 | 7 |
| 09/10/94 | 86 | 58 | 72 | 0.00 | 0.0 | 0 | | W | 2.9 | CLR | 0 | 7 |
| 09/11/94 | 87 | 60 | 74 | 0.00 | 0.0 | 0 | | WNW | 1.8 | CLR | 0 | 9 |
| 09/12/94 | 86 | 61 | 74 | 0.00 | 0.0 | 0 | F | SW | 2.4 | PC | 0 | 9 |
| 09/13/94 | 87 | 60 | 74 | 0.00 | 0.0 | 0 | F | SW | 4.9 | CLR | 0 | 9 |
| 09/14/94 | 91 | 66 | 79 | 0.00 | 0.0 | 0 | | SW | 5.9 | CLR | 0 | 14 |
| 09/15/94 | 88 | 62 | 75 | 0.00 | 0.0 | 0 | | SW | 7.0 | PC | 0 | 10 |
| 09/16/94 | 87 | 65 | 76 | 0.11 | 0.0 | 0 | TRW,RW | SW | 6.9 | CLDY | 0 | 11 |
| 09/17/94 | 78 | 59 | 69 | 0.00 | 0.0 | 0 | | N | 4.7 | CLR | 0 | 4 |
| 09/18/94 | 80 | 54 | 67 | 0.00 | 0.0 | 0 | | NE | 2.7 | CLR | 0 | 2 |
| 09/19/94 | 83 | 52 | 68 | 0.00 | 0.0 | 0 | | WSW | 1.7 | CLR | 0 | 3 |
| 09/20/94 | 83 | 52 | 68 | 0.00 | 0.0 | 0 | | SE | 2.3 | CLR | 0 | 3 |
| 09/21/94 | 83 | 53 | 68 | 0.00 | 0.0 | 0 | | S | 3.5 | CLDY | 0 | 3 |
| 09/22/94 | 73 | 52 | 63 | 0.32 | 0.0 | 0 | R,RW,L,R- | S | 6.9 | CLDY | 2 | 0 |
| 09/23/94 | 54 | 50 | 52 | 0.64 | 0.0 | 0 | R-,RW-, R,L | NW | 2.9 | CLDY | 13 | 0 |
| 09/24/94 | 70 | 48 | 59 | 0.08 | 0.0 | 0 | R,RW,L,F | W | 2.7 | PC | 6 | 0 |
| 09/25/94 | 68 | 52 | 60 | 0.14 | 0.0 | 0 | TRW,R,L | SW | 3.5 | CLDY | 5 | 0 |
| 09/26/94 | 63 | 52 | 58 | 1.33 | 0.0 | 0 | TRW,R,R W,R-,L | S | 2.9 | CLDY | 7 | 0 |
| 09/27/94 | 55 | 49 | 52 | 0.00 | 0.0 | 0 | L | W | 6.9 | CLDY | 13 | 0 |
| 09/28/94 | 68 | 47 | 58 | 0.00 | 0.0 | 0 | | WNW | 5.7 | CLR | 7 | 0 |
| 09/29/94 | 77 | 44 | 61 | 0.00 | 0.0 | 0 | | NW | 1.9 | CLR | 4 | 0 |
| 09/30/94 | 84 | 50 | 67 | 0.00 | 0.0 | 0 | | S | 7.2 | PC | 0 | 2 |
| Total/ Average[5] | 76.5 | 54.3 | 65.4 | 3.21 | 0.0 | | | W | 3.8 | | 76 | 96 |
| Departure from Average | -1.2 | -0.9 | -1.1 | -0.15 | +0.0 | | | SW | -1.3 | | -5 | -21 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL<br>Water Survey Research Center | | | | Local Climatological Data<br>Illinois State Water Survey | | | | October 1994<br>Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 10/01/94 | 87 | 56 | 72 | 0.00 | 0.0 | 0 | | SW | 8.2 | PC | 0 | 7 |
| 10/02/94 | 73 | 54 | 64 | 0.00 | 0.0 | 0 | | NW | 5.9 | CLDY | 1 | 0 |
| 10/03/94 | 70 | 49 | 60 | 0.00 | 0.0 | 0 | | NE | 4.8 | CLDY | 5 | 0 |
| 10/04/94 | 68 | 50 | 59 | 0.00 | 0.0 | 0 | | NE | 3.6 | CLDY | 6 | 0 |
| 10/05/94 | 66 | 47 | 57 | 0.00 | 0.0 | 0 | | NE | 2.0 | CLDY | 8 | 0 |
| 10/06/94 | 74 | 46 | 60 | 0.00 | 0.0 | 0 | | SE | 6.9 | CLDY | 5 | 0 |
| 10/07/94 | 80 | 54 | 67 | 0.00 | 0.0 | 0 | | S | 10.9 | PC | 0 | 2 |
| 10/08/94 | 68 | 50 | 59 | 1.32 | 0.0 | 0 | R,RW,L | S | 7.5 | CLDY | 6 | 0 |
| 10/09/94 | 62 | 42 | 52 | 0.00 | 0.0 | 0 | | NW | 5.0 | CLR | 13 | 0 |
| 10/10/94 | 61 | 40 | 51 | 0.00 | 0.0 | 0 | | NE | 4.3 | CLR | 14 | 0 |
| 10/11/94 | 65 | 38 | 52 | 0.00 | 0.0 | 0 | | ENE | 3.6 | CLR | 13 | 0 |
| 10/12/94 | 70 | 40 | 55 | 0.00 | 0.0 | 0 | | E | 2.1 | PC | 10 | 0 |
| 10/13/94 | 67 | 49 | 58 | 0.00 | 0.0 | 0 | | NE | 2.6 | CLDY | 7 | 0 |
| 10/14/94 | 63 | 55 | 59 | 0.00 | 0.0 | 0 | L | NE | 3.3 | CLDY | 6 | 0 |
| 10/15/94 | 72 | 52 | 62 | 0.00 | 0.0 | 0 | | E | 3.1 | CLDY | 3 | 0 |
| 10/16/94 | 76 | 54 | 65 | 0.00 | 0.0 | 0 | | SE | 4.5 | PC | 0 | 0 |
| 10/17/94 | 76 | 50 | 63 | 0.03 | 0.0 | 0 | R-,L | S | 6.3 | CLDY | 2 | 0 |
| 10/18/94 | 63 | 58 | 61 | 0.53 | 0.0 | 0 | R,RW-,L | S | 8.8 | CLDY | 4 | 0 |
| 10/19/94 | 73 | 50 | 62 | 0.01 | 0.0 | 0 | L,F | W | 5.6 | PC | 3 | 0 |
| 10/20/94 | 67 | 43 | 55 | 0.00 | 0.0 | 0 | | W | 3.6 | CLR | 10 | 0 |
| 10/21/94 | 73 | 40 | 57 | 0.00 | 0.0 | 0 | | SE | 1.3 | CLR | 8 | 0 |
| 10/22/94 | 73 | 49 | 61 | 0.00 | 0.0 | 0 | | SW | 4.0 | CLR | 4 | 0 |
| 10/23/94 | 62 | 40 | 51 | 0.00 | 0.0 | 0 | | W | 6.1 | CLR | 14 | 0 |
| 10/24/94 | 54 | 36 | 45 | 0.21 | 0.0 | 0 | R,RW-,L | W | 5.6 | PC | 20 | 0 |
| 10/25/94 | 47 | 31 | 39 | 0.00 | 0.0 | 0 | | W | 4.8 | PC | 26 | 0 |
| 10/26/94 | 53 | 34 | 44 | 0.00 | 0.0 | 0 | | NW | 2.4 | CLR | 21 | 0 |
| 10/27/94 | 58 | 29 | 44 | 0.00 | 0.0 | 0 | | S | 5.3 | CLR | 21 | 0 |
| 10/28/94 | 62 | 35 | 49 | 0.00 | 0.0 | 0 | | S | 10.9 | CLR | 16 | 0 |
| 10/29/94 | 68 | 45 | 57 | 0.00 | 0.0 | 0 | | SW | 8.1 | PC | 8 | 0 |
| 10/30/94 | 66 | 50 | 58 | 0.00 | 0.0 | 0 | | NE | 4.2 | CLDY | 7 | 0 |
| 10/31/94 | 51 | 35 | 43 | 1.01 | 0.0 | 0 | TRW,R,R-,L | NE | 10.9 | CLDY | 22 | 0 |
| Total/ Average[5] | 66.7 | 45.2 | 56.0 | 3.11 | 0.0 | | | NE | 5.4 | | 283 | 9 |
| Departure from Average | +1.6 | +1.4 | +1.5 | +0.43 | -0.1 | | | S | -0.7 | | -66 | -7 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | November 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 11/01/94 | 52 | 34 | 43 | 0.00 | 0.0 | 0 | | NW | 7.1 | PC | 22 | 0 |
| 11/02/94 | 64 | 34 | 49 | 0.00 | 0.0 | 0 | | S | 10.7 | PC | 16 | 0 |
| 11/03/94 | 73 | 48 | 61 | 0.02 | 0.0 | 0 | RW-,L | S | 12.9 | CLDY | 4 | 0 |
| 11/04/94 | 66 | 59 | 63 | 1.43 | 0.0 | 0 | TRW,R,R W+,L | S | 13.3 | CLDY | 2 | 0 |
| 11/05/94 | 65 | 51 | 58 | 0.83 | 0.0 | 0 | TRW-, RW+,R-,F | S | 9.6 | CLDY | 7 | 0 |
| 11/06/94 | 57 | 44 | 51 | 0.00 | 0.0 | 0 | | W | 8.9 | CLR | 14 | 0 |
| 11/07/94 | 59 | 36 | 48 | 0.00 | 0.0 | 0 | | S | 7.8 | PC | 17 | 0 |
| 11/08/94 | 64 | 42 | 53 | 0.00 | 0.0 | 0 | | S | 8.7 | CLDY | 12 | 0 |
| 11/09/94 | 61 | 42 | 52 | 1.19 | 0.0 | 0 | R,L,F | NE | 10.6 | CLDY | 13 | 0 |
| 11/10/94 | 53 | 35 | 44 | 0.00 | 0.0 | 0 | | NE | 7.9 | CLR | 21 | 0 |
| 11/11/94 | 58 | 31 | 45 | 0.00 | 0.0 | 0 | F | SE | 4.7 | PC | 20 | 0 |
| 11/12/94 | 53 | 44 | 49 | 0.00 | 0.0 | 0 | L | SSW | 8.2 | CLDY | 16 | 0 |
| 11/13/94 | 67 | 52 | 60 | 0.00 | 0.0 | 0 | | S | 14.0 | CLDY | 5 | 0 |
| 11/14/94 | 62 | 45 | 54 | 0.32 | 0.0 | 0 | R,R-,L | SW | 8.6 | CLDY | 11 | 0 |
| 11/15/94 | 51 | 39 | 45 | 0.00 | 0.0 | 0 | | NE | 7.7 | CLDY | 20 | 0 |
| 11/16/94 | 55 | 34 | 45 | 0.00 | 0.0 | 0 | | NE | 4.4 | PC | 20 | 0 |
| 11/17/94 | 49 | 33 | 41 | 0.00 | 0.0 | 0 | L,F | S | 10.1 | CLDY | 24 | 0 |
| 11/18/94 | 60 | 35 | 48 | 0.00 | 0.0 | 0 | F | W | 8.6 | CLR | 17 | 0 |
| 11/19/94 | 49 | 33 | 41 | 0.00 | 0.0 | 0 | | NE | 3.3 | CLDY | 24 | 0 |
| 11/20/94 | 58 | 43 | 51 | 0.64 | 0.0 | 0 | R,L | SE | 9.3 | CLDY | 14 | 0 |
| 11/21/94 | 54 | 34 | 44 | 0.14 | 0.0 | 0 | TRW,A | SW | 14.8 | PC | 21 | 0 |
| 11/22/94 | 35 | 26 | 31 | 0.00 | 0.0 | 0 | | NW | 7.3 | CLDY | 34 | 0 |
| 11/23/94 | 44 | 24 | 34 | 0.00 | 0.0 | 0 | | W | 8.4 | CLR | 31 | 0 |
| 11/24/94 | 51 | 30 | 41 | 0.00 | 0.0 | 0 | | SW | 11.1 | CLR | 24 | 0 |
| 11/25/94 | 50 | 32 | 41 | 0.00 | 0.0 | 0 | | N | 2.9 | CLR | 24 | 0 |
| 11/26/94 | 52 | 29 | 41 | 0.00 | 0.0 | 0 | | E | 3.9 | PC | 24 | 0 |
| 11/27/94 | 61 | 40 | 51 | 0.58 | 0.0 | 0 | TRW,R,L | SE | 13.2 | CLDY | 14 | 0 |
| 11/28/94 | 44 | 33 | 39 | 0.00 | 0.0 | 0 | | SW | 16.2 | PC | 26 | 0 |
| 11/29/94 | 43 | 27 | 35 | 0.00 | 0.0 | 0 | | W | 6.8 | CLR | 30 | 0 |
| 11/30/94 | 39 | 26 | 33 | 0.00 | T | 0 | SW- | W | 5.7 | CLR | 32 | 0 |
| Total/ Average[5] | 55.0 | 37.2 | 46.1 | 5.15 | T | | | S | 8.9 | | 559 | 0 |
| Departure from Average | +4.7 | +3.4 | +4.0 | +2.05 | -2.2 | | | SW | +1.4 | | -137 | +0 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.

| Champaign, IL Water Survey Research Center | | | | Local Climatological Data Illinois State Water Survey | | | | December 1994 Summary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature | | | Precip | Snow[1] | | Weather | Wind | | Sky | Degree Days[2] | |
| Date | Max. | Min. | Mean | Inches | Inches | Depth | Types[3] | Dir. | Speed | Cover[4] | Heat | Cool. |
| 12/01/94 | 53 | 28 | 41 | 0.00 | 0.0 | 0 | | S | 12.3 | CLR | 24 | 0 |
| 12/02/94 | 57 | 29 | 43 | 0.00 | 0.0 | 0 | | S | 9.0 | CLR | 22 | 0 |
| 12/03/94 | 53 | 41 | 47 | 0.00 | 0.0 | 0 | L | S | 8.5 | CLDY | 18 | 0 |
| 12/04/94 | 61 | 43 | 52 | 0.00 | 0.0 | 0 | L,F | E | 2.7 | CLDY | 13 | 0 |
| 12/05/94 | 54 | 41 | 48 | 0.01 | 0.0 | 0 | L,F | NW | 4.4 | CLDY | 17 | 0 |
| 12/06/94 | 44 | 38 | 41 | 0.73 | 0.0 | 0 | R,R-,L,F | NE | 3.9 | CLDY | 24 | 0 |
| 12/07/94 | 46 | 32 | 39 | 0.14 | 0.0 | 0 | R,L | N | 7.8 | CLDY | 26 | 0 |
| 12/08/94 | 37 | 29 | 33 | 0.00 | 0.0 | 0 | | SE | 4.7 | CLDY | 32 | 0 |
| 12/09/94 | 37 | 29 | 33 | 0.13 | 0.0 | 0 | R,L | N | 6.2 | CLDY | 32 | 0 |
| 12/10/94 | 34 | 20 | 27 | 0.00 | 0.0 | 0 | | NW | 8.8 | CLDY | 38 | 0 |
| 12/11/94 | 25 | 13 | 19 | 0.00 | 0.0 | 0 | SW- | NW | 4.9 | CLDY | 46 | 0 |
| 12/12/94 | 31 | 20 | 26 | 0.00 | 0.0 | 0 | | SE | 3.9 | CLDY | 39 | 0 |
| 12/13/94 | 29 | 20 | 25 | 0.00 | 0.0 | 0 | | NE | 2.8 | CLDY | 40 | 0 |
| 12/14/94 | 38 | 23 | 31 | 0.00 | 0.0 | 0 | | E | 4.2 | CLDY | 34 | 0 |
| 12/15/94 | 41 | 28 | 35 | 0.01 | 0.0 | 0 | IP,F | SE | 3.4 | CLDY | 30 | 0 |
| 12/16/94 | 44 | 34 | 39 | 0.65 | 0.0 | 0 | R,L,F | SE | 8.1 | CLDY | 26 | 0 |
| 12/17/94 | 46 | 32 | 39 | 0.00 | 0.0 | 0 | | W | 9.7 | CLDY | 26 | 0 |
| 12/18/94 | 32 | 29 | 31 | 0.00 | 0.0 | 0 | SG- | NW | 6.4 | CLDY | 34 | 0 |
| 12/19/94 | 41 | 26 | 34 | 0.00 | 0.0 | 0 | | S | 7.7 | CLDY | 31 | 0 |
| 12/20/94 | 51 | 31 | 41 | 0.00 | 0.0 | 0 | L | SE | 6.5 | CLDY | 24 | 0 |
| 12/21/94 | 52 | 29 | 41 | 0.00 | 0.0 | 0 | | ESE | 3.1 | PC | 24 | 0 |
| 12/22/94 | 55 | 36 | 46 | 0.00 | 0.0 | 0 | | NNE | 4.1 | CLDY | 19 | 0 |
| 12/23/94 | 40 | 33 | 37 | 0.00 | 0.0 | 0 | | N | 8.4 | CLDY | 28 | 0 |
| 12/24/94 | 40 | 30 | 35 | 0.00 | 0.0 | 0 | L,F | N | 7.6 | CLDY | 30 | 0 |
| 12/25/94 | 50 | 27 | 39 | 0.00 | 0.0 | 0 | | NW | 4.8 | PC | 26 | 0 |
| 12/26/94 | 51 | 24 | 38 | 0.00 | 0.0 | 0 | F | SE | 2.4 | CLR | 27 | 0 |
| 12/27/94 | 53 | 23 | 38 | 0.00 | 0.0 | 0 | | S | 5.4 | CLR | 27 | 0 |
| 12/28/94 | 38 | 32 | 35 | 0.00 | 0.0 | 0 | | N | 6.7 | PC | 30 | 0 |
| 12/29/94 | 38 | 28 | 33 | 0.00 | 0.0 | 0 | | NE | 7.0 | PC | 32 | 0 |
| 12/30/94 | 44 | 25 | 35 | 0.00 | 0.0 | 0 | R-,L- | NE | 3.1 | PC | 30 | 0 |
| 12/31/94 | 37 | 32 | 35 | 0.23 | 0.6 | 0 | R-,L,S-,F | N | 5.0 | CLDY | 30 | 0 |
| Total/ Average[5] | 43.6 | 29.2 | 36.4 | 1.90 | 0.6 | | | N | 5.9 | | 879 | 0 |
| Departure from Average | +7.1 | +7.2 | +7.2 | -1.12 | -5.4 | | | SW | -2.0 | | -238 | +0 |

[1]Snow depth at 7 AM LST.

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

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

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

[5]Averages 1961-1990 data.