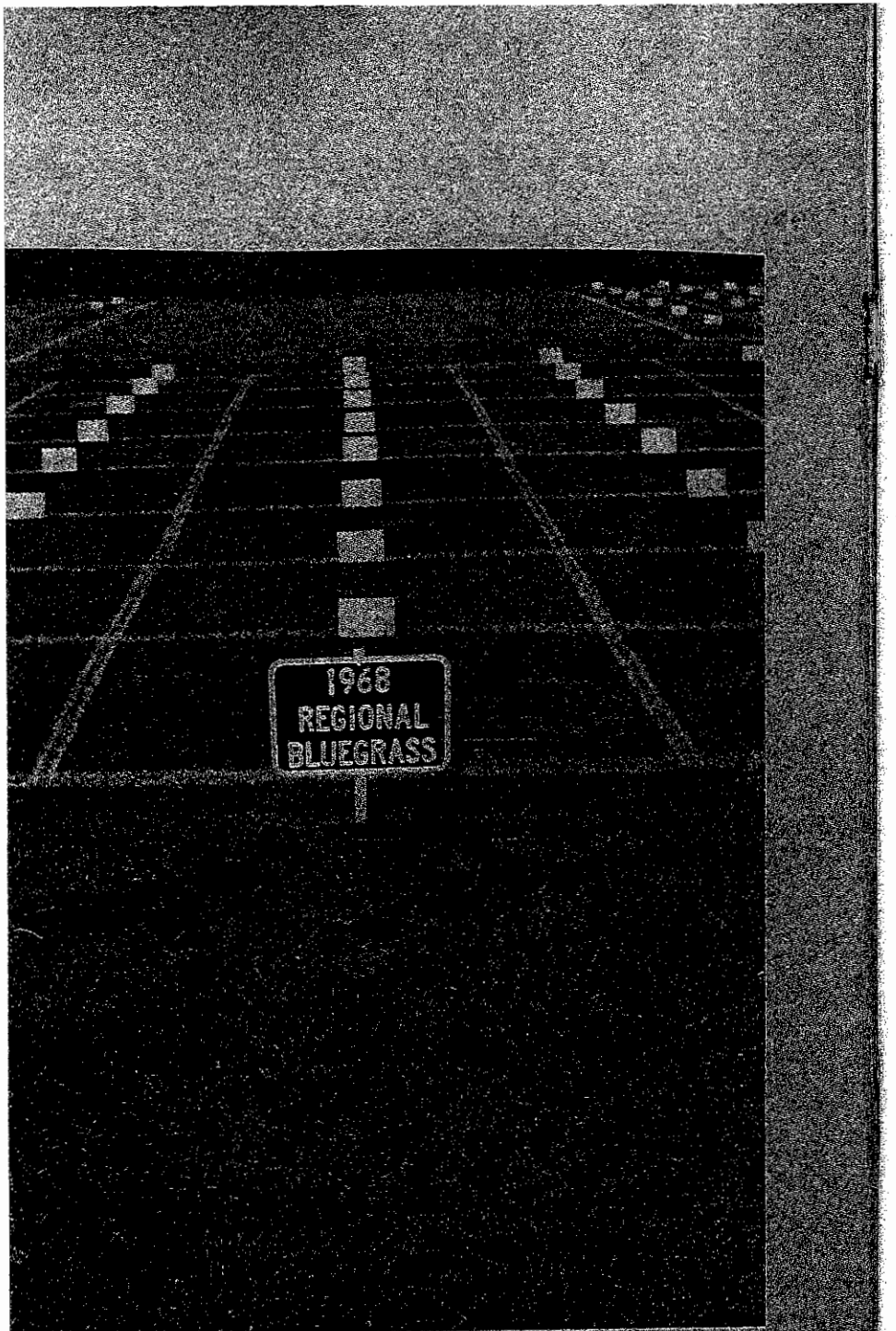
EXHIBIT 8a
#32

Bulletin 814 May 1977

Northeastern Regional Turfgrass Evaluation of Kentucky Bluegrasses (*Poa pratensis* L.) 1968-1973

by NE-57 Technical Research Committee

The Pennsylvania State University
College of Agriculture
Agricultural Experiment Station
University Park, Pennsylvania



ucky bluegrass plots at the Pennsylvania location.

NORTHEASTERN REGIONAL RESEARCH PUBLICATION

This study was part of Northeastern Regional Research Project N.E.-57, "Breeding and Evaluation of Kentucky Bluegrass for Turf," a cooperative study involving agricultural experiment stations in the Northeastern Region and supported in part by regional funds from the United States Department of Agriculture. It pertains to the turfgrass performance of 43 cultivars and selections of Kentucky bluegrass, which were evaluated from 1968 through 1973 using several turfgrass quality parameters and standardized rating systems.

ADMINISTRATIVE ADVISOR

Pennsylvania W. I. Thomas

COOPERATING AGENCIES AND CONTRIBUTORS

ARS, USDA	J. J. Murray
Connecticut	R. J. Lukens
Maryland	E. E. Deal, J. R. Hall, and A. J. Powell
New Jersey	C. R. Funk
New York	J. F. Cornman and R. C. O'Knefski
Pennsylvania	J. M. Duich, D. V. Waddington, and T. L. Watschke
Rhode Island	C. R. Skogley
Vermont	G. M. Wood
Virginia	R. E. Schmidt and L. H. Taylor

This study was supported in part by funds from the Cooperative State Research Service, U.S. Department of Agriculture, Regional Research Project Number NE-57, and by appropriations from the Pennsylvania Legislature and the United States Congress.

Authorized for publication February 18, 1977.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLES

INTRODUCTION

Turfgrasses are a very important commodity in today's society. Estimates placed the cost of maintaining 3 million acres of turf in the 12 Northeastern States at a billion dollars and replacement costs at nearly tenfold that amount (Nutter, 1965). In terms of property and aesthetic values and usefulness in recreation and environmental enhancement, turf is of immeasurable value. Our society has created a demand for more dependable high-quality turf with greater disease and insect resistance and tolerance to heat, drought, close mowing, wear, and shade. Attractive, dependable, and easy-to-grow cultivars would have a highly stimulating effect on programs to beautify America and to conserve and better utilize our natural resources.

Kentucky bluegrass, *Poa pratensis* L., is the most widely used turfgrass species in the region. Bluegrass cultivars of improved performance are of immense interest and value to millions of homeowners, the sod industry, expanding recreational interests, those responsible for maintaining public and private turf areas, and the grass seed industry.

Merion Kentucky bluegrass has had the greatest impact of any bluegrass cultivar since its commercial introduction in 1952. Its success was due to a more dense, uniform-appearing turf with a high degree of resistance to helminthosporium leaf spot and foot and crown rots. As the only improved turf-type cultivar for many years, its use spread quickly throughout the bluegrass belt. The advent of Merion bluegrass, the mechanical sodcutter, and 2,4-D herbicide resulted in the birth and rapid growth of the cultivated-sod industry.

Since 1952, nearly 70 million pounds of Merion seed have been produced for turf in the United States (Table 1). Merion

is a very highly apomictic bluegrass (Duich and Musser, 1959) and is therefore nearly genetically uniform. With its widespread use, a number of pathological problems have been found to seriously affect its turfgrass performance. Although cyclic in years and locations, these problems were encountered by consumers and investigators in an evolving pattern: leaf and stem rusts in the mid-1950's; followed by powdery mildew, fusaria, and sclerotinia dollar spot in the early 1960's; stripe smut in the mid-1960's; and high temperature helminthosporia in more recent years. It is most significant that nearly 3 decades were required to both encounter and identify problems relating to a single, and nearly genetically uniform, source of germplasm. A concentrated regional research approach is justified to alleviate similar bluegrass cultivar-related situations.

The complexity and scope of a turfgrass species improvement program dictates the use of a coordinated regional approach for greatest effectiveness. The factor of regional adaptation is critical in any breeding and varietal use program. While some factors significant in determining cultivar usefulness will likely be constant throughout the Northeast, others are sure to vary. A critical assessment of regional variations in genotype-

Table 1. Annual domestic seed production of Merion Kentucky bluegrass, 1954-1975.(Merion Bluegrass Association)

Year*	Pounds	Year	Pounds
1954	764,000	1965	3,740,000
1955	772,000	1966	5,302,000
1956	1,130,000	1967	6,047,000
1957	1,923,000	1968	3,855,000
1958	1,598,000	1969	2,498,000
1959	2,515,000	1970	3,068,000
1960	2,717,000	1971	4,840,000
1961	2,987,000	1972	4,542,000
1962	3,615,000	1973	3,650,000
1963	3,268,000	1974	3,826,000
1964	3,425,000	1975	1,795,000
		Total	67,877,000

**No production figures for 1952-53; estimated at 350,000 pounds.*

environment interactions is necessary for the efficient development and use of turfgrass cultivars.

Large numbers of promising plants are generated in any breeding program. Much of the actual work in plant breeding involves the evaluation of such plants under a wide range of environmental and use situations. Breeding work at a number of locations has added to a growing list of experimental cultivars being assembled for evaluation under a uniform rating scheme. This evaluation requires a regional team approach involving turfgrass agronomists, physiologists, geneticists, soil scientists, and pathologists.

Breeding perennial turfgrasses is both costly and time-consuming. Many states and seed companies cannot support an adequate turfgrass breeding program. Cooperative efforts and resources of a number of states in a regional approach should permit considerable progress and accomplishment. This regional program should avoid unnecessary duplication of effort and make the most efficient use of the facilities and personnel of all participating states. It will shorten the time needed for evaluation of breeding stocks and varieties and promote greater accuracy and standardization of varietal recommendations between states, both of which help to ensure that released cultivars will be used where best adapted. The efficiency and effectiveness of such an approach has been amply demonstrated by the success of cooperative research efforts throughout the country.

This study was a part of Northeastern Regional Project N.E.-57, "Breeding and Evaluation of Kentucky Bluegrass for Turf." Its objectives were to regionally assess the turfgrass performance of available commercial and experimental cultivars of Kentucky bluegrass, define turfgrass quality parameters, and develop standardized rating systems. Tests were conducted from 1968 through 1973 at 11 locations in 8 states.

MATERIALS AND METHODS

BASIS FOR SELECTION OF ENTRIES AND SITE DESCRIPTIONS. The 43 entries chosen for this regional research (Table 2) included com-

Table 2. Kentucky bluegrass entries in Northeastern Regional Research Project NE-57, 1968-1973.

Entry	Other Designation	Origin	Components
A-10	. . .	Warren's Turf Nursery, Ill.	1
A-20	. . .	Warren's Turf Nursery, Ill.	1
A-34	Ben Sun	Warren's Turf Nursery, Ill.	1
Adelphi	NJE P-69	New Jersey AES	1
Aquila	K8-145	D. J. van der Have, Netherlands	1
Arista	. . .	Gebr. van Engelen, Netherlands	1
Belturf	S-5	USDA, ARS, Beltsville, Md.	1
Birka	WK-411	Weibullsholm, Sweden	1
Campus	. . .	Gebr. van Engelen, Netherlands	1
Cougar	PNW 204+402+602	Washington AES	1
Delta	Athabasca	Canada Dep. of Agric., Ont.	1
Fylking	0217	Swedish Seed Assn., Sweden	1
Geary	Code 95	Ed Geary, Oregon	multiple
Georgetown	PP-1	Rhode Island AES	1
K8-144	. . .	D. J. van der Have, Netherlands	1
K8-146	. . .	D. J. van der Have, Netherlands	1
Kenblue	Kentucky common	Kentucky AES	multiple
Merion	B-27	USGA Green Section & CRD-ARS	1
Minnesota 6	. . .	Minnesota AES	6
Newport	. . .	Washington & Oregon AES, & SCS	1
NJE P-5	. . .	New Jersey AES	1
NJE P-35	. . .	New Jersey AES	1
NJE P-56	. . .	New Jersey AES	1
NJE P-114	. . .	New Jersey AES	1
Nugget	Hope dwarf	Alaska AES & CRD-ARS	1
Palouse	. . .	Washington AES	multiple
Park	Minn. 95	Minnesota AES	15
Pennstar	PSU K5-47	Pennsylvania AES	1
Prato	. . .	D. J. van der Have, Netherlands	1
Primo	. . .	Weibullsholm, Sweden	1
PSU K-107	. . .	Pennsylvania AES	1
PSU K-128	. . .	Pennsylvania AES	1
PSU K-162	. . .	Pennsylvania AES	1
S-21	. . .	Jacklin Seed Co., Wash.	1
Sodco	. . .	Indiana AES	4
S. Dak. Certified	S. Dak. common	South Dakota AES	multiple
Sydsport	Southport	Weibullsholm, Sweden	1
Trenton	NJE P-115	New Jersey AES	1
Vantage	Ba 61-24	O. M. Scott & Sons, Ohio	1
Windsor	S-2	O. M. Scott & Sons, Ohio	1
WK-408	. . .	Weibullsholm, Sweden	1
WK-412	. . .	Weibullsholm, Sweden	1
Zwartburg(identity not verified)			unknown

mercially available cultivars plus experimentals that were selected for their turf potential. They were from diverse origins and represented a wide spectrum of Kentucky bluegrass types from upright to decumbent.

Pennsylvania was responsible for distributing seed for 41 entries and sod for two entries (A-10 and A-20) to the participating research stations. All stations established their tests in the fall of 1968 and the sod entries were added in the spring of 1969. All seeded plots were established at a rate of 1.0 kg/100m^2. Each site had three replications and plot size was 1.2 X 1.8m. The sites represented several soil types and provided the geographic diversity (for climatological differences) needed to assess the regional adaptability of the entries. Locations differed in the degree of moisture stress allowed and in their fertility and mowing management. New Jersey, Rhode Island, and Pennsylvania had the most intensive mowing management, with Pennsylvania mowing three times per week. Diseases occurred at all stations, but only New York applied fungicides. All stations reported weed infestations and all applied herbicides. Management details are in Table 3.

EVALUATION CRITERIA. Quality and density were rated periodically throughout the test. At most stations, ratings were taken monthly during the growing season, using a scale of 1 to 9, with 9 equal to the best possible condition. Turfgrass quality ratings reflected the overall condition of each entry and were primarily affected by density, texture, disease, and color. Density ratings were made on the basis of both tiller density and uniformity of ground cover.

Diseases were rated when they occurred. Field data were collected for leaf spot (*Helminthosporium* sp.), red thread (*Corticium fuciforme* [Berk.] Wakef.), dollar spot (*Sclerotinia homoeocarpa* F. T. Bennett), rust (*Puccinia* sp.), and stripe smut (*Ustilago striiformis* [Westend.] Niessl). Powdery mildew (*Erysiphe graminis* DC) was evaluated in greenhouse tests at Vermont and New Jersey. For disease, the rating scale used was 1 to 9, with 9 equal to no disease.

Seedheads were counted in Pennsylvania in late May 1970. Three counts per plot were made inside a 900 cm^2 quadrant. Winter survival was rated at Vermont, where the plots were rated for reduction in stand from the fall of 1970 to the spring of 1971.

Thatch was measured at Maryland, Rhode Island, and Virginia during the 1974 growing season. Four plugs (5 cm diameter) were taken from each plot, and leaves were immediately sheared to the top of the thatch layer. In a laboratory, thatch thickness was

Table 3. Site descriptions and management practices in Northeastern Regional Kentucky bluegrass trials.

Location	Soil Type	pH	Ratio*	Rate**	Fertilizer Timing Amt.	Fertilizer Timing Month	N Source	Mowing Ht(cm)	Mowing Frequency	Mowing Clippings Removed	Moisture Stress Allowed
Mt. Carmel, CONNECTICUT	Cheshire sandy loam	. . .	5-3-2	0.49	0.49	May	10-6-4 30% org.	3.8	Weekly	No	Moderate
Centreville, MARYLAND	Sassafrass loam	6.0-7.0	2-1-1	1.47	0.49 0.49 0.49	Sept Oct Feb	Soluble 16-8-8	5.0	Weekly	No	Severe
Fairland, MARYLAND	Chillum silt loam	6.0-7.0	2-1-1	1.47	0.49 0.49 0.49	Sept Oct Feb	Soluble 16-8-8	3.8	Weekly	No	Slight
Fairland, MARYLAND	Chillum silt loam	6.0-7.0	2-1-1	1.47	0.49 0.49 0.49	Sept Oct Feb	Soluble 16-8-8	6.2	Weekly	No	Slight
New Brunswick, NEW JERSEY	Nixon loam	6.0-6.5	5-3-2	1.96	0.49 0.49 0.49 0.49	Apr May Sept Oct	Soluble 10-6-4 33.5-0-0 45-0-0	1.9	Twice weekly	No	Severe
Ithaca, NEW YORK	Niagara silt loam	6.0-6.3	5-3-2	1.47	0.49 0.49 0.49	May Sept Oct	Soluble 10-6-4	3.8	Weekly	No	Moderate
Nassau County, NEW YORK	Hempstead loam	6.3-6.5	5-3-2	1.47	0.49 0.49 0.49	May Sept Oct	Soluble 10-6-4	3.8	Weekly	Yes	Slight
University Park, PENNSYLVANIA	Hagerstown silt loam	6.5-6.8	2-1-1	1.96	0.98 0.98	May Sept	10-5-5 25% Organic	3.0	Thrice weekly	Yes	Moderate
Kingston, RHODE ISLAND	Bridgehampton silt loam	5.8-6.5	6-1-4	1.96	0.49 0.49	Apr, June Aug, Sept	12-2-8 3.6% WIN	1.9	Twice weekly	No	None
Kingston, RHODE ISLAND	Bridgehampton silt loam	6.1-6.5	6-1-4	1.96	0.49 0.49	Apr, June Aug, Sept	12-2-8 3.6% WIN	3.8	Twice weekly	No	None
Burlington, VERMONT	Vergennes clay loam	5.6-6.5	2-1-1	1.96	0.65 0.65 0.65	May July Sept	UF 10-5-5 5.0% WIN	3.8	Weekly	No	Severe
Blacksburg, VIRGINIA	Frederick silt loam	6.2-6.5	3-2-2	1.47	0.49 0.49 0.49	Aug Oct May	Soluble 33.5-0-0	3.8	Weekly	Yes	Moderate
Blacksburg, VIRGINIA	Frederick silt loam	6.2-6.5	5-2-2	2.44	0.49 0.49 0.49 0.49 0.49	Aug Sept Oct Jan May	Soluble 33.5-0-0	3.8	Weekly	Yes	Moderate
Newport News, VIRGINIA	Duplin loam	6.2-6.5	2-1-1	1.72	0.49 0.74 0.49	Sept Nov Dec	Soluble 33.5-0-0	5.0	Weekly	Yes	Moderate
Newport News, VIRGINIA	Duplin loam	6.2-6.5	2-1-1	1.72	0.49 0.74 0.49	Sept Nov Dec	Soluble 33.5-0-0	5.0 (1968-71) 2.5 (1972-74)	Weekly	Yes	Moderate

*N P O K

**Kg N/100 m^2/year

measured uncompressed and while compressed by a 1-kg weight. The thatch from each plug was dried to obtain thatch dry weight and ashed at 550 C to obtain ashed weight. Loss on ignition was reported as thatch organic-matter weight.

STATISTICAL PROCEDURES. Results were analyzed using analysis of variance of test means. Means were compared using Duncan's Multiple Range Test at the 5% level. Duncan's comparisons were not used for combined data because not all entries were used at each location. Correlation coefficients were used to evaluate the relationships between evaluation criteria.

RESULTS AND DISCUSSION

QUALITY. Turfgrass quality represented assessments of the overall condition of the various bluegrasses. Density, texture, disease, color, and other factors that influence the appearance of turfgrass stands are integral parts of turfgrass quality. Ratings were made periodically over the duration of the testing period, but they were not made in all months and all years at each location. Ratings for 1969, the first year of establishment, were generally lower in spring and summer and higher in fall than for the following years (1970 through 1973). Also, considerable variation in quality occurred between locations in 1969. Monthly ratings at each location are listed for each bluegrass in Appendix Table i.

To determine trends in quality as affected by location and month, average monthly ratings were calculated for those locations where ratings were made for at least 3 years after the 1969 season (Table 4). Exclusion of 1969 results and of values based on less than 3 years' data provided more representative values for locations and months over years. Differences in ratings between states are not due solely to differences in environmental conditions (temperature, rainfall, soil types, etc.). Scores were affected by standards imposed by the investigators making

Table 4. Monthly quality ratings for each location over all entries and 3 or 4 years, excluding 1969 data.

Location	Mowing ht(cm)	Monthly quality rating (9 = highest quality) April	May	June	July	Aug	Sept	Oct	Nov	Avg
Mount Carmel, CONNECTICUT	3.8	. . .	6.3	6.5	6.8	6.3	. . .	. . .	. . .	6.5
Centreville, MARYLAND	5.0	5.8	5.7	6.6	5.8	5.5	5.0	5.7	5.6	5.7
Fairland, MARYLAND	3.8	5.7	6.4	5.9	5.6	6.3	5.1	5.7	6.2	5.9
Fairland, MARYLAND	6.2	5.9	6.4	6.0	5.8	6.4	5.6	6.0	6.5	6.1
New Brunswick, NEW JERSEY	1.9	5.0	4.9	4.8	5.2	. . .	. . .	5.4	5.3	5.1
University Park, PENNSYLVANIA	3.0	5.4	6.4	6.3	6.4	6.4	6.6	6.6	. . .	6.3
Kingston, RHODE ISLAND	1.9	4.4	6.0	5.7	6.2	6.8	7.2	7.5	7.2	6.4
Kingston, RHODE ISLAND	3.8	3.6	5.5	5.9	6.7	7.4	7.6	7.8	7.1	6.4
Burlington, VERMONT	3.8	. . .	6.9	5.8	5.9	6.6	7.0	7.6	. . .	6.6
Blacksburg, VIRGINIA*	3.8	6.1	6.6	6.4	6.9	. . .	. . .	6.4	7.2	6.6
Blacksburg, VIRGINIA**	3.8	6.8	6.6	6.8	7.3	. . .	7.3	7.2	. . .	7.0
Newport News, VIRGINIA	5.0	6.7	6.1	7.1	. . .	6.6	5.7	. . .	. . .	6.4
	Average	5.5	6.2	6.2	6.8	7.2	7.1	7.3	6.4	

* *Low fertility (1.47 kg N/100m^2/season).*
** *High fertility (2.44 kg N/100m^2/season).*

the ratings; thus an average such as 5.1 for the New Jersey location could be a reflection of lower scoring by a particular investigator rather than a true indication of poorer turf quality. Also, the best quality of turf attainable with a given management program is not necessarily equal to the best quality attainable under different management conditions. Therefore, the most meaningful comparisons of quality ratings would be between months at a given location or between the relative ranks of entries at individual locations, rather than between ratings from different locations.

Different mowing height or fertility treatments used at the

same location affected quality (Table 4). At Fairland, Maryland, turfgrass quality was slightly higher in plots with a 6.2 cm mowing height than in ones with a 3.8 cm mowing height, with the greatest differences occurring in the fall. At Rhode Island, the higher-cut (3.8 cm) turf had poorer quality in April and May, but was better than the low-cut (1.9 cm) turf from June through October. Turf quality at Blacksburg, Virginia, was better at the higher fertilization rate.

In Appendix Table ii, the ranks of mean monthly quality ratings over all management treatments are indicated for each entry at each location. Based on results from Duncan's comparisons, entries were separated into three groups for each month. The highest group included the highest ranking entry plus all other entries not significantly lower in quality rating. When a single entry rated significantly higher than all others, the second highest entry was used as a basis for the highest group. The lowest group was comprised of all entries significantly lower in quality than the lowest ranking entry in the highest group. All other entries were placed in an intermediate group.

Regional performance of the entries is indicated by the mean annual quality ranks for 11 locations (Table 5). The frequency with which an entry fell into high or low groupings was used to obtain a regional appraisal of consistency of quality during the growing season. Based on the high and low groupings used in Appendix Table ii, good separation of varieties was obtained by determining which entries were in the highest group at 60% of the locations and which were in the lowest group at 50% of the locations (Fig. 1). Annual rank (Table 5) and quality consistency (Fig. 1) gave similar groupings of the entries. A-34 and A-20 exhibited the best quality, and 11 of both the top and bottom 12 entries were common to each listing. The monthly assessments of entries shown in Figure 1 should be of value in selecting blends of bluegrass that would provide components for good quality throughout the growing season.

The relative performance of entries was not the same at all locations. An example of the location-entry interaction was the

Table 5. Mean annual quality ranks of Kentucky bluegrass over 5 years at 11 locations, listed according to increasing average rank.

Entry	Mount Carmel, CONNECTICUT	Centreville, MARYLAND	Fairland, MARYLAND	New Brunswick, NEW JERSEY	Ithaca, NEW YORK	Nassau County, NEW YORK	University Park, PENNSYLVANIA	Kingston, RHODE ISLAND	Burlington, VERMONT	Blacksburg, VIRGINIA	Newport News, VIRGINIA	Average Rank
A-34	8	9	2	11	13	7	5	5	6	14	3	8
A-20	1	. . .	1	6	3	14	22	4	1	5	22	8
Trenton	15	. . .	7	. . .	. . .	. . .	16	2	4	. . .	. . .	9
Birka	6	10	5	9	25	3	3	11	19	13	4	10
WK-412	3	12	8	7	19	4	6	12	16	20	2	10
Sodco	21	15	19	1	5	6	14	9	10	6	6	10
Fylking	5	32	6	2	9	9	2	17	17	7	9	10
NJE P-35	7	. . .	20	. . .	. . .	. . .	18	6	5	11	. . .	11
Georgetown	28	1	4	21	7	21	10	13	12	9	11	12
NJE P-114	22	20	33	10	2	12	15	3	7	3	. . .	13
Sydsport	16	8	13	17	20	10	13	7	14	21	1	13
Merion	17	19	3	24	26	5	9	10	2	22	7	13
Pennstar	9	33	21	5	8	18	1	18	13	10	15	14
Belturf	2	2	16	14	18	17	29	21	9	8	19	14
PSU K-107	14	29	15	4	15	8	4	16	21	16	. . .	14
PSU K-128	. . .	. . .	23	8	. . .	. . .	8	15	20	. . .	. . .	15
Adelphi	32	. . .	26	. . .	. . .	. . .	17	8	8	1	. . .	15
Aquila	. . .	5	18	12	16	15	. . .	20	23	19	17	16
NJE P-56	37	25	40	3	1	11	7	1	11	2	21	16
K8-144	. . .	6	17	13	23	13	. . .	23	26	18	12	17
Vantage	35	3	14	19	11	26	20	22	25	12	5	17
Nugget	36	27	42	16	12	1	11	14	3	27	. . .	19
K8-146	. . .	4	12	15	32	16	. . .	24	33	23	14	19
NJE P-5	38	22	34	18	. . .	. . .	19	19	15	4	10	20
Windsor	26	7	11	23	24	19	25	25	18	25	16	20
Cougar	18	14	35	25	17	20	27	28	29	30	20	24
Primo	11	30	10	27	30	24	23	27	34	24	23	24
Newport	33	13	9	38	21	25	21	30	37	26	13	24
WK-408	30	26	28	37	. . .	2	32	34	30	17	8	24
Prato	12	17	39	31	6	22	28	33	27	35	25	25
PSU K-162	27	. . .	29	20	. . .	. . .	31	29	22	. . .	. . .	26
A-10	13	. . .	30	30	4	29	38	41	42	15	30	27
Arista	29	34	27	28	10	23	24	31	43	28	32	28
Minnesota 6	4	16	38	36	22	30	37	40	24	37	26	28
Zwartberg	39	. . .	31	22	. . .	. . .	12	32	35	29	. . .	28
Kenblue	10	11	37	34	29	27	36	36	32	34	31	29
Campus	19	. . .	36	26	. . .	. . .	26	26	41	32	. . .	29
S-21	24	23	22	33	33	32	35	38	28	33	24	30
Geary	25	21	32	29	31	33	34	39	31	38	18	30
Palouse	23	28	24	35	28	28	33	42	36	36	29	31
Delta	34	18	43	39	14	35	39	35	38	31	27	32
Park	31	31	25	32	27	34	30	37	39	40	28	32
S. Dak. Certified	20	24	41	40	34	31	40	43	40	39	33	35

contrast in quality ratings of Merion and NJE P-114 at three locations (Fig. 2). Merion consistently had higher quality at Fairland, Maryland, whereas NJE P-114 had higher quality throughout the year at New Jersey. Comparisons of Birka and Nugget at three locations (Fig. 3) show that Nugget quality was lower than that of Birka throughout the season at Fairland, Maryland; whereas at Vermont and Rhode Island, Nugget quality was more outstanding in June and July. Another contrast in results at different locations was the June and July decline in quality of Birka at Vermont. A third example of different relative performance was the reversal of Adelphi and A-10 rankings at Connecticut and Pennsylvania (Fig. 4). At Blacksburg, Virginia, these two entries were similar in performance except in May and June, when

Fig.1. Regional assessment of turfgrass quality at all locations and density at six locations based on 1969 - 1973 ratings.

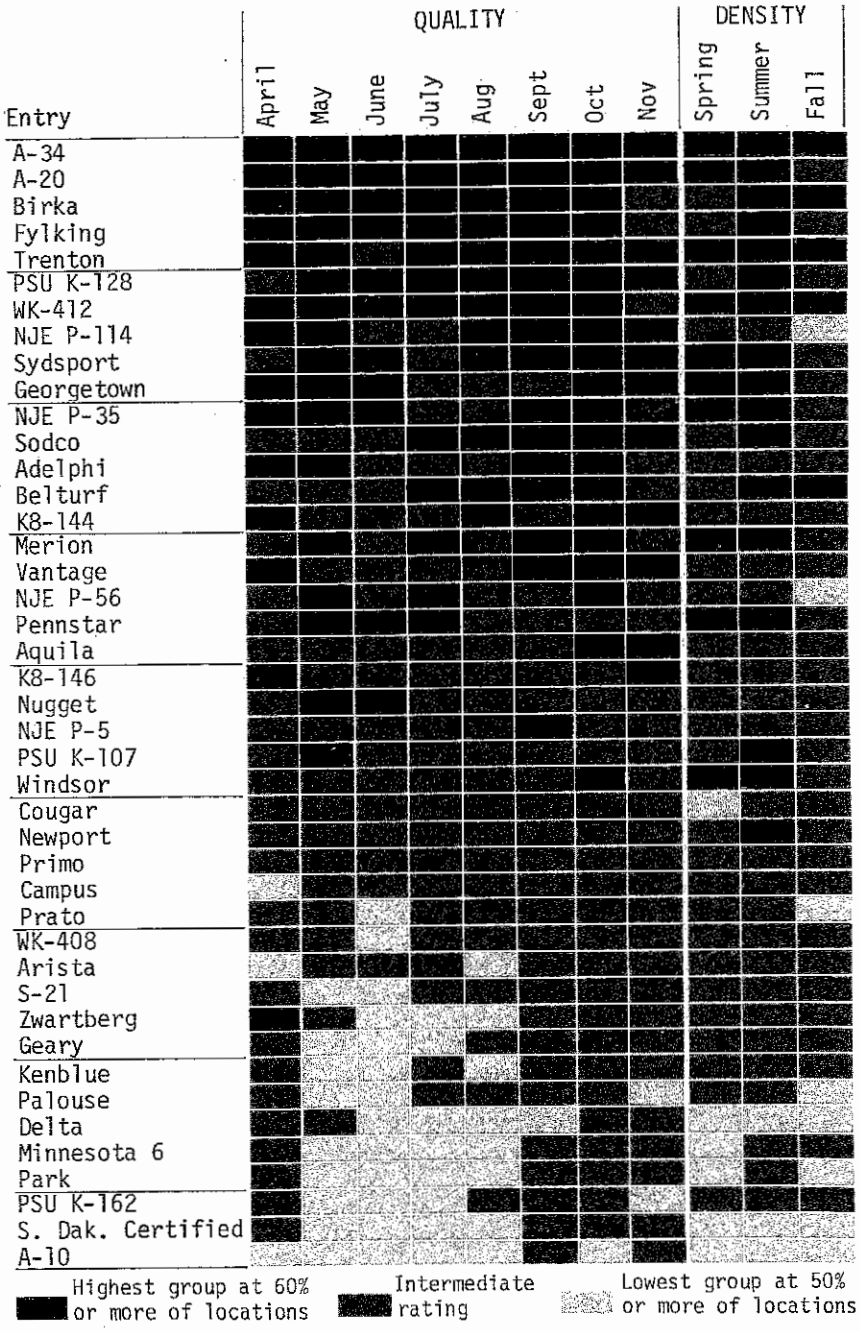


Fig. 2. Turf quality of Merion and NJE P-114 bluegrasses at three locations.

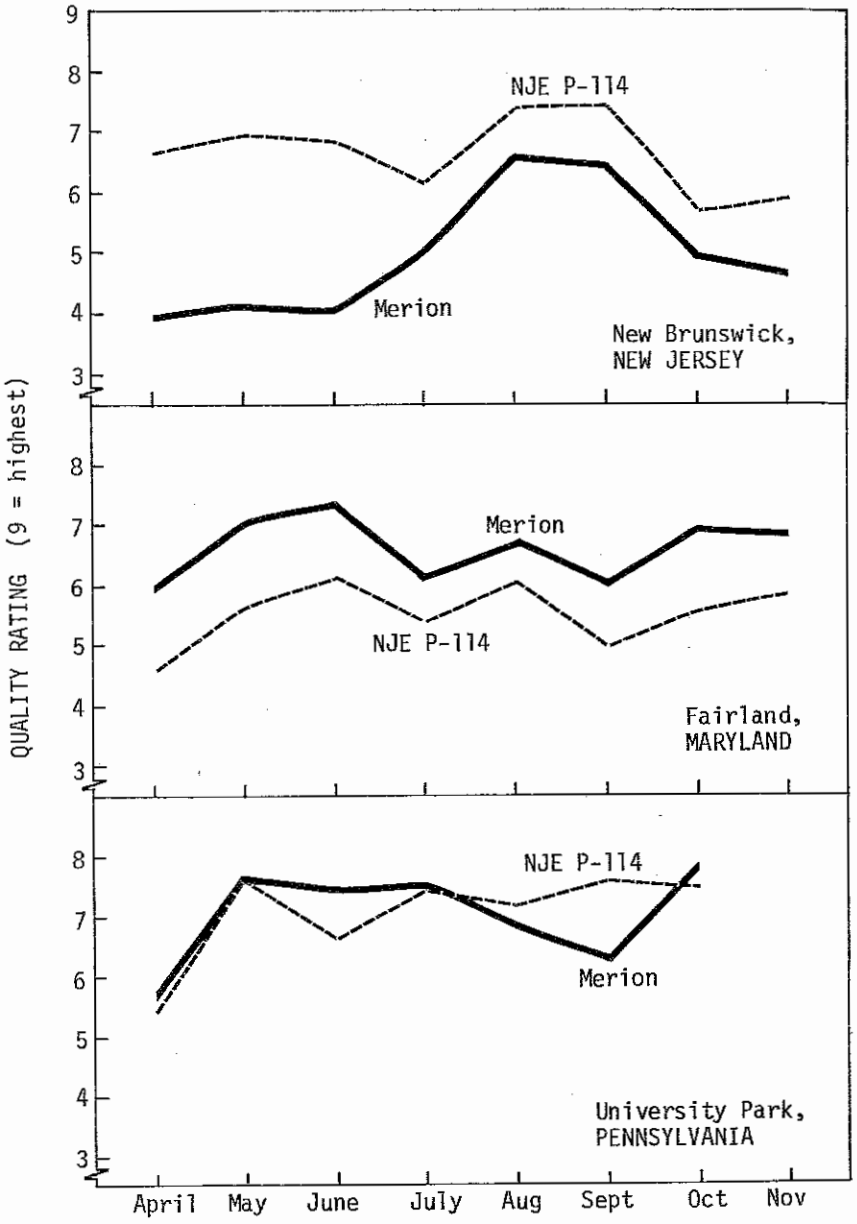


Fig. 3. Turf quality of Birka and Nugget bluegrasses at three locations.

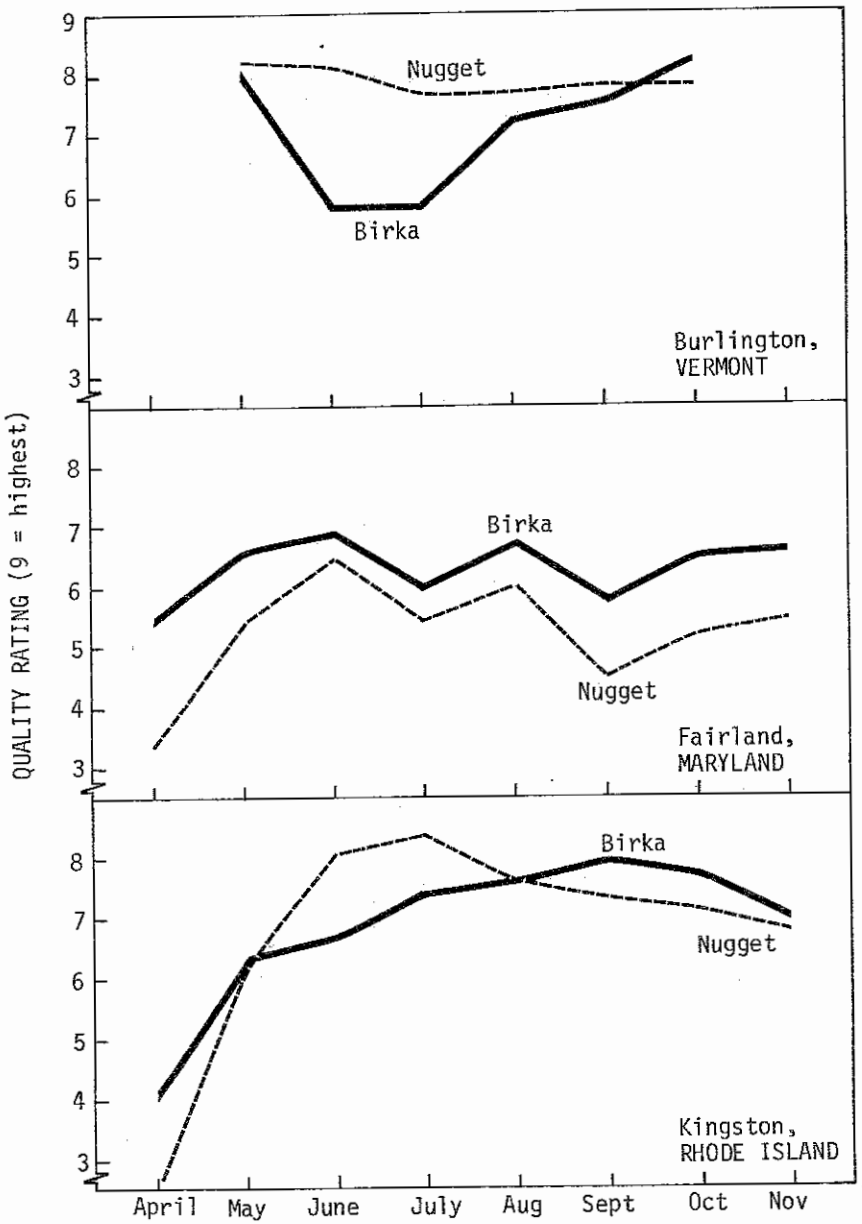
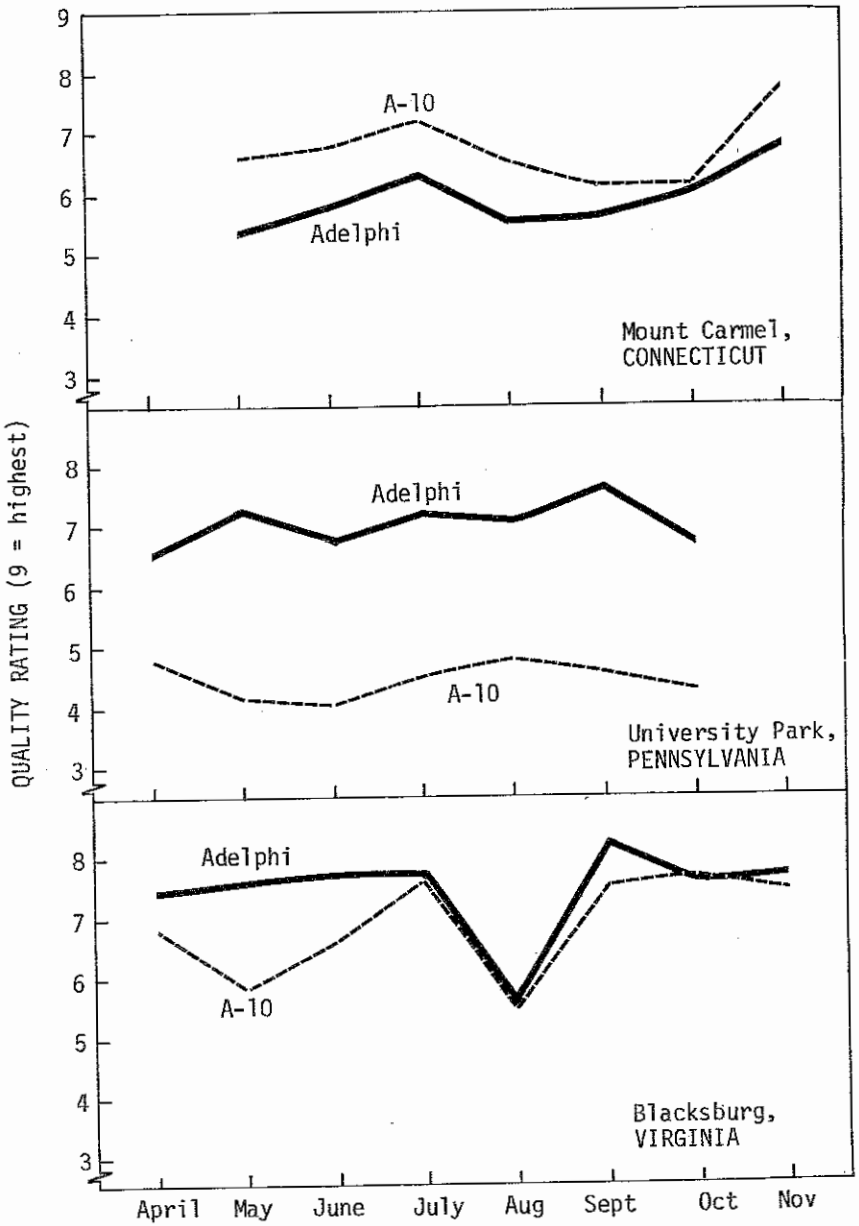


Fig. 4. Turf quality of Adelphi and A-10 bluegrasses at three locations.



Adelphi had better quality.

One benefit of regional evaluations is that results from a neighboring state may offer a broader base for recommending varieties within a state. As examples: New Brunswick, New Jersey, and Fairland, Maryland, are more representative than University Park, Pennsylvania, of conditions in southeastern Pennsylvania; and Blacksburg, Virginia, and University Park, Pennsylvania, have conditions more similar to western Maryland's than do either Fairland or Centreville, Maryland. Ideally, recommendations within a state will not be limited to those grasses that had the best quality at a single location in that state.

DENSITY. Density ratings assessed the thickness of the stand and were based on both tiller density and uniformity of ground cover. Density was rated in the spring (April, May, June), summer (July, Aug), and fall (Sept, Oct, and Nov), with ratings for all three seasons being obtained from Connecticut; Pennsylvania; Centreville, Maryland; Fairland, Maryland (at two cutting heights); and Vermont. Using data from these sites and following the same procedure used for quality, the frequency of high and low grouping was determined for density (Fig. 1). As indicated in the following section, density was an important component of quality.

QUALITY AND DENSITY CORRELATIONS. Significant correlations existed between quality and density. Spring density correlated better with May quality ($r = 0.76$) than with April or June quality ($r = 0.55$ and 0.59, respectively). Summer density correlated with June, July, and August quality ($r = 0.71$, 0.58, and 0.64, respectively). The highest quality-density correlations occurred with fall density ratings and September ($r = 0.79$) and October quality ($r = 0.80$). The correlation dropped in November ($r = 0.50$). These results exemplify the strong influence of density on quality ratings. Color ratings, taken at some locations but not included in this report, did not correlate with quality as well as density did.

In the spring, highest correlations between turf density and

leaf spot resistance were found at New Jersey ($r = 0.92$) and Pennsylvania ($r = 0.80$). This leaf spot resistance was best correlated with quality in May ($r = 0.61$) and June ($r = 0.64$). Good correlation between summer density and spring leaf spot resistance ($r = 0.86$) occurred at the Pennsylvania site; however, correlation was poor at other sites, possibly due to differences in recovery, the presence of other diseases, or other factors that could affect summer density.

Although spring and summer ratings of leaf spot resistance correlated significantly ($r = 0.65$), correlations between summer rating and monthly quality ratings were either nonsignificant or very low.

Thatch measurements and monthly quality ratings were also compared. Thatch weight correlated best with October and November quality ($r = 0.77$ and 0.71, respectively). Compressed thickness correlated with September quality ($r = 0.72$), and uncompressed thatch correlated best with July through October quality ($r = 0.64$, 0.62, 0.65, and 0.64). All other r values for thatch vs. quality were lower.

DISEASE. Resistance to disease is an important aspect of turf quality. Disease incidence is a reflection of the susceptibility of an individual organism to a specific pathogen under a particular set of environmental conditions. Therefore, disease susceptibility of a Kentucky bluegrass may not be noted in certain areas at times when it is quite evident in others.

A regional evaluation permits turf to be grown under different environments, thus exposing new cultivars to many possible disease situations. Although all diseases known to attack Kentucky bluegrasses were not observed in this regional test, many common diseases did occur and evaluations were made to determine susceptibility. Even though susceptibility of an entry was noted at only one station, the entry was considered to have potential regional susceptibility.

Table 6. Mean and rank for Kentucky bluegrass disease ratings (9 = no disease) for stripe smut, powdery mildew, and rust.

Disease:	STRIPE SMUT						POWDERY MILDEW				LEAF RUST		STEM RUST	
Location:	NEW JERSEY (New Brunswick)		RHODE ISLAND (Kingston)		RHODE ISLAND (Kingston)		NEW JERSEY (New Brunswick)		VERMONT (Burlington)		NEW JERSEY (New Brunswick)		VIRGINIA (Newport News)	
Entry	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
A-20	9.0	1	9.0	1	9.0	1	. . .	. . .	5.4	14	9.0	1	. . .	. . .
A-10	9.0	1	9.0	1	9.0	1	. . .	. . .	4.8	19	. . .	. . .	. . .	. . .
K8-144	9.0	1	9.0	1	7.0	24	9.0	1	8.4	2	7.5	21	8.8	10
Aquila	9.0	1	9.0	1	9.0	1	9.0	1	8.1	3	7.5	21	9.0	1
K8-146	9.0	1	5.0	26	9.0	1	9.0	1	9.0	1	7.5	21	6.8	32
PSU K-126	9.0	1	. . .	. . .	9.0	1	9.0	1	3.7	30	9.0	1	. . .	. . .
PSU K-162	9.0	1	. . .	. . .	6.0	27	8.3	21	3.4	31	4.5	36	. . .	. . .
Zwartberg	9.0	1	5.0	26	9.0	1	6.1	32	1.0	37	9.0	1	5.8	35
Kenblue	9.0	1	9.0	1	7.0	24	8.9	16	7.5	6	7.5	21	7.8	27
Minnesota 6	9.0	1	7.0	22	4.0	32	9.0	1	7.0	7	9.0	1	9.0	1
WK-412	9.0	1	9.0	1	9.0	1	9.0	1	6.6	10	8.5	8	3.5	37
Birka	9.0	1	9.0	1	9.0	1	. . .	. . .	8.1	3	. . .	. . .	6.5	34
WK-408	9.0	1	. . .	. . .	4.0	32	9.0	1	4.3	24	9.0	1	8.8	10
S-21	9.0	1	4.0	31	4.0	32	8.5	19	6.4	11	8.0	19	9.0	1
A-34	9.0	1	9.0	1	9.0	1	8.2	22	4.6	23	7.5	21	9.0	1
Nugget	9.0	1	9.0	1	9.0	1	9.0	1	5.4	14	9.0	1	8.8	10
Sydsport	9.0	1	9.0	1	9.0	1	7.6	25	6.4	11	8.5	8	8.5	19
S. Dak. Certified	9.0	1	. . .	. . .	. . .	. . .	8.1	23	5.2	16	7.5	21	8.0	23
Vantage	9.0	1	5.0	26	7.0	24	7.2	29	3.4	31	2.5	37	2.5	38
Campus	8.5	20	7.0	22	9.0	1	7.4	26	3.9	28	7.0	31	8.0	23
NJE P-56	8.5	20	9.0	1	9.0	1	9.0	1	. . .	. . .	8.5	8	7.0	31
Fylking	8.5	20	4.0	31	4.0	32	6.1	32	1.0	37	8.5	8	8.5	19
Geary	8.5	20	7.0	22	. . .	. . .	8.9	16	4.3	24	7.0	31	9.0	1
Park	8.5	20	5.0	26	5.0	28	9.0	1	4.8	19	9.0	1	9.0	1
Pennstar	8.5	20	5.0	26	4.0	32	5.8	35	1.0	37	8.5	8	9.0	1
Palouse	8.5	20	4.0	31	5.0	28	9.0	1	7.0	7	7.0	31	9.0	1
PSU K-107	8.0	27	9.0	1	9.0	1	6.3	31	1.0	37	8.5	8	8.8	10
NJE P-5	8.0	27	7.0	22	5.0	28	8.9	16	6.4	11	7.5	21	8.0	23
NJE P-114	8.0	27	9.0	1	9.0	1	6.0	34	2.8	33	7.5	21	7.5	29
Belturf	8.0	27	9.0	1	9.0	1	5.4	37	1.0	37	8.5	8	7.5	29
Sodco	8.0	27	9.0	1	9.0	1	9.0	1	7.0	7	7.5	21	7.8	27
Arista	7.5	32	9.0	1	9.0	1	7.8	24	5.2	16	7.5	21	8.8	10
Georgetown	7.0	33	9.0	1	9.0	1	6.7	30	4.8	19	8.5	8	8.8	10
Delta	7.0	33	9.0	1	9.0	1	8.4	20	4.3	24	8.5	8	8.5	19
Cougar	5.5	35	4.0	31	4.0	32	9.0	1	7.8	5	8.5	8	8.5	19
Primo	3.5	36	4.0	31	4.0	32	9.0	1	5.2	16	8.5	8	6.8	32
Prato	3.5	36	4.0	31	5.0	28	7.3	27	1.6	36	8.0	19	8.0	23
Newport	3.5	36	4.0	31	4.0	32	9.0	1	3.9	28	6.5	35	9.0	1
Merion	3.0	39	4.0	31	4.0	32	3.5	37	1.0	37	6.5	34	5.0	36
Windsor	3.0	39	4.0	31	4.0	32	7.3	27	4.8	19	. . .	. . .	8.8	10
NJE P-35	. . .	. . .	9.0	1	9.0	1	. . .	. . .	1.3	35	. . .	. . .	8.8	10
Adelphi	. . .	. . .	9.0	1	9.0	1	. . .	. . .	1.9	34	. . .	. . .	8.6	18
Trenton	. . .	. . .	9.0	1	9.0	1	. . .	. . .	4.3	24	. . .	. . .	. . .	. . .
Mowing Ht(cm)	1.9		1.9		3.8		unclipped				1.9		5.0	

Stripe Smut, *Ustilago striiformis*.

This disease appears to be more prevalent in Kentucky bluegrasses that tiller profusely (Britton, 1969). Merion Kentucky bluegrass has been found to be very susceptible (Kreitlow and Juska, 1959; Gaskin, 1966; and Halisky *et al.*, 1966). Cougar, Primo, Prato, Newport, Merion, and Windsor were reported to be susceptible to stripe smut in both New Jersey and Rhode Island (Table 6).

Powdery Mildew, *Erysiphe graminis*.

Powdery mildew has become an important disease of Kentucky bluegrass with the introduction of improved cultivars such as Merion (Britton, 1969). This disease is most damaging in shade and under high nitrogen fertility. Greenhouse data obtained in New Jersey and Vermont showed that Merion, NJE P-114, PSU K-107, Pennstar, Belturf, Zwartberg, and Fylking were most susceptible to powdery mildew (Table 6).

Rust, *Puccinia* sp.

Couch (1962) stated that rust became an important turfgrass disease with the introduction of the highly susceptible cultivar Merion. Selections most susceptible to leaf rust (*Puccinia poae-nemoralis*) in New Jersey were Merion, Vantage, Newport, and PSU K-162 (Table 6). The Kentucky bluegrasses most seriously infected with stem rust (*Puccinia graminis*) in Virginia were Merion, Vantage, and WK-412.

Leaf Spot, *Helminthosporium* sp.

Diseases caused by *Helminthosporium* fungi possibly influence the acceptance of a Kentucky bluegrass selection for turf usage more than any other disease. Merion Kentucky bluegrass exhibits good resistance to these organisms under field conditions (Britton, 1969). Halisky *et al.* (1966) reported that Pennstar, Anheuser Dwarf, and Merion exhibited a high degree of resistance; Cougar and Newport showed moderate resistance; and Delta, Park, and Common were highly susceptible. Data collected in this regional test confirmed these reports (Table 7) and provide credibility to susceptibility measurements of other Kentucky bluegrass selections. Sixteen selections were rated higher or as high as Merion in resistance to spring leaf spot. However, no selection was more resistant to leaf spot in summer than Merion, with only NJE P-56 and Sodco rated equal. The narrow-leaf upright selections generally were more susceptible to *Helminthosporium* fungi than the lower-growing selections.

Dollar Spot, *Sclerotinia homoeocarpa*.

Dollar spot does not destroy Kentucky bluegrass quickly, especially if adequate moisture and nitrogen fertility are available to the plant (Britton, 1969). However, this disease considerably reduces turf quality during weather ideal to the develop-

able 7. Mean and rank for Kentucky bluegrass disease resistance ratings (9 = no disease) for spring leaf spot (April, May, June), summer leaf spot (July, August, September), dollar spot, and red thread.

	Leaf Spot Spring		Leaf Spot Summer		Dollar Spot		Red Thread	
ıtry	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
-20	8.4	1	6.8	24	7.3	6	6.5	31
JE P-56	8.2	2	8.0	1	6.6	30	8.0	7
ıgget	8.2	2	7.1	17	3.9	43*	2.0	40
delphi	7.9	4	7.1	17	7.2	9	8.0	7
JE P-114	7.9	4	7.3	15	7.0	20	5.0	39
JE P-35	7.8	6	7.4	14	7.6	2	9.0	1
ɔdco	7.8	6	8.0	1	7.2	9	8.0	7
JE P-5	7.7	8	7.6	8	7.2	9	8.0	7
/lking	7.6	9	7.6	8	6.8	27	7.0	27
/dsport	7.6	9	7.9	4	5.9	37	8.0	7
ennstar	7.5	11	7.5	13	6.5	34	7.3	26
irka	7.5	11	7.7	5	7.0	20	7.0	27
K-412	7.5	11	6.8	24	6.7	28	7.0	27
-34	7.4	14	7.6	8	6.7	28	8.0	7
eorgetown	7.4	14	7.6	8	7.1	16	9.0	1
enton	7.4	14	5.8	39	6.8	26	8.0	7
erion	7.2	17	8.0	1	5.8	38	6.0	35
SU K-128	7.2	17	3.0	43	7.3	6	8.0	7
SU K-107	7.1	18	7.7	5	6.5	34	7.5	23
/artberg	6.7	19	6.5	31	7.0	20	8.2	5
ıntage	6.6	20	7.6	8	7.3	6	6.5	31
imo	6.4	21	7.0	20	7.2	9	7.7	20
lturf	6.2	22	7.7	5	7.2	9	6.5	31
-144	6.1	23	6.6	28	5.4	40	. . .	. . .
SU K-162	6.0	24	6.4	32	8.0	1	8.2	5
-146	6.0	24	6.8	24	5.4	40	. . .	. . .
wport	5.9	26	7.2	16	7.2	9	9.0	1
mpus	5.8	27	6.0	36*	5.6	39	8.0	7
uila	5.6	28	6.7	27	5.1	42	. . .	. . .
ista	5.6	28	7.1	17	6.6	30*	7.5	23
ndsor	5.4	30	7.0	20	6.6	30	5.5	37
ugar	5.3	31	7.0	20*	6.6	30	8.0	7
ato	5.1	32*	6.9	23	7.0	20	6.0	35
rk	4.9	33*	5.9	38	7.4	5	7.5	23
lta	4.8	34	5.1	41	6.0	36*	7.7	20
21	4.8	34	5.6	40	7.2	9	8.3	4
-408	4.8	34	6.6	28*	7.1	16	6.5	31
nnesota 6	4.6	37	6.9	23	7.5	4	8.0	7
louse	4.6	37*	6.3	35*	7.6	2	7.7	20
10	4.3	39*	5.0	42	7.0	20	6.7	30
ary	4.3	39*	6.4	32	7.1	16	8.0	7
nblue	3.8	41*	6.4	32*	6.9	25	8.0	7
Dak. Certified	3.8	41*	6.0	36*	7.1	16	5.5	37
. of Locations Reporting:	9		4		4		1	

ndicates poorest resistance at one or more locations.

ment of the causal fungus. No entry showed excellent resistance to dollar spot. Selections evaluated in the regional test that were most susceptible to dollar spot infection were Nugget, Aquil K8-144, and K8-146 (Table 7).

Red Thread, *Corticium fuciforme*.

Red thread has been identified as a pathogen capable of causing severe damage to all commonly cultivated turfgrass species in the cool, humid area of North America (Couch, 1962). Damage from this fungus can be materially curtailed by increasing soil fertility (Couch, 1962; and Britton, 1969). Red thread ratings of the Pennsylvania test showed that Nugget, NJE P-114, South Dakota Certified, and Windsor were most susceptible (Table 7). The Kentucky bluegrasses with the least red thread were Georgetown, Newport, and NJE P-35.

Fusarium Blight, *Fusarium roseum* and *Fusarium tricinctum*.

Two fungi, *F. roseum* and *F. tricinctum* are associated with the symptoms of fusarium blight, a disease first observed on Merion Kentucky bluegrass in southeastern Pennsylvania in 1959 (Couch and Bedford, 1966). Since that time severe sporadic infestations have been reported throughout the Northeast and other parts of the country on various Kentucky bluegrass cultivars. Although this disease occurs on Kentucky bluegrass over a wide geographical range, no one has been able to reproduce the symptoms by artificial inoculation (Cole, 1976). Several workers (Cole, 1976; Couch, 1976; Turgeon, 1976; and Funk, 1976) have associated fusarium blight with high temperatures, drought stress excessive nitrogen, and turf 3 years old or older that has developed some thatch.

Cole (1976) suggested that races and strains of *Fusarium* organisms interact differently with different species and strains o grasses, causing a cultivar to be resistant in one place but susceptible in another. Turgeon (Ill., 1976) and Funk (N. J., 1976) reported that Adelphi, Enmundi, P-59, and Windsor did not show symptoms of fusarium blight when other Kentucky bluegrasses were

infected. However, Glade, Majestic, Touchdown, and Victa showed no symptoms in Illinois, but showed some infection in New Jersey.

Although personnel involved in this regional test have reported fusarium blight in their states, no infestations of this disease were reported as significantly occurring on any regional test site. However, due to the difficulty of control and the severeness of this disease, additional studies within the Northeast are needed to evaluate Kentucky bluegrass for stable, race-nonspecific resistance to fusarium blight.

THATCH ACCUMULATION. Thatch is the undecomposed accumulated layer of leaves, stems, roots, and rhizomes between green vegetation and the soil surface. Although formation of some thatch may be beneficial, excessive thatch accumulation may result in reduced turf quality. Heavy accumulation of thatch provides an ideal microenvironment and medium for disease-causing organisms and insects, reduces the effectiveness of chemical pesticides, interferes with good soil-plant-water interrelations, and increases heat and cold injury (Beard, 1973; and Madison, 1970).

Beard (1973) pointed out that improved cultivars such as Merion Kentucky bluegrass possess vigorous shoot growth that is associated with a greater thatching tendency, especially under low-traffic conditions. Information on thatch tendencies of the various Kentucky bluegrasses is essential in selecting cultivars and in following appropriate management practices.

Correlations involving methods of thatch measurement included data from Kentucky bluegrass selections that were evaluated at three or more locations. Correlations were based on 192 observations for organic-matter dry weight and compressed thatch thickness and 152 observations for uncompressed thatch thickness. Compressed and uncompressed thatch thicknesses were significantly correlated with each other ($r = 0.76$), and the correlation coefficients of organic-matter dry weights with compressed and uncompressed thatch thicknesses were $r = 0.73$ and $r = 0.52$, respectively. In view of the time required and the possibility of error in obtaining organic matter weights, compressed thatch thickness measurements should provide a satisfactory method of evaluating thatch accumulation of Kentucky bluegrasses.

Based on organic-matter dry weight and uncompressed and compressed thatch thicknesses, K8-144, Aquila, A-20, Nugget, Sodco, WK-412, Birka, and Pennstar on the average developed the most thatch; Palouse, Cougar, S-21, Campus, South Dakota Certified, Delta, Minnesota 6, and Arista developed the least thatch (Table 8).

Although there was variation between locations in average thatch accumulation, the differences may be due to management and date of sampling (Tables iii, iv, and v). At Newport News, Virginia, thatch samples were taken in the summer of 1974 and the other locations were sampled a year earlier. However, the heavier thatch organic-matter dry weight (Table iii) and the greater thatch compressed thickness (Table iv) obtained from the Newport News test as compared with those from the Blacksburg test confirmed observations made by Virginia researchers. The greater thatch accumulation obtained from the warmer test site is thought to occur because of the longer growing period. Also, the high temperatures and limited soil moisture during the summer months possibly reduced soil biological activity and, consequently, the decomposition of thatch.

Different cutting heights at Newport News and nitrogen fertilization regimes at Blacksburg did not statistically influence organic thatch weight development. However, the higher mowing heights in Rhode Island produced 25% more thatch accumulation than the lower mowing heights, as determined by compressed thatch thickness and organic-matter dry weight.

The lack of difference in organic thatch weight between mowing heights at Newport News is possibly because differential clipping heights were imposed on the bluegrass only for the last 2 years of the study, whereas in Rhode Island the clipping height variable was conducted from the beginning of the experiment.

WINTER SURVIVAL. In the northern section of the Northeastern Region many Kentucky bluegrass cultivars are often injured during

Table 8. Mean thatch measurements of compressed thatch thickness, uncompressed thatch thickness, and thatch organic-matter weights of 5 cm diameter plugs of Kentucky bluegrass from up to five locations.

Entry	Compressed Thickness		Uncompressed Thickness		Organic Matter	
	cm	Rank	cm	Rank	grams	Rank
Palouse	1.51	1	2.00	2	3.54	1
Cougar	1.51	1	2.18	9	3.55	2
Park	1.52	3	2.16	7	4.54	39
S-21	1.54	4	2.08	5	3.68	6
Geary	1.55	5	1.94	1	4.01	17
S. Dak. Certified	1.55	5	2.07	4	3.78	8
Campus	1.55	5	2.27	14	3.73	7
Delta	1.57	8	2.16	7	3.56	3
Minnesota 6	1.58	9	2.14	6	3.85	11
Arista	1.59	10	2.21	12	3.93	14
Prato	1.60	11	2.03	3	4.11	20
Zwartberg	1.62	12	2.38	16	4.08	19
Adelphi	1.62	13	2.32	15	3.82	10
Newport	1.64	14	2.20	11	3.86	12
PSU K-162	1.65	15	2.52	29	3.86	12
Kenblue	1.68	16	2.19	10	3.67	5
Trenton	1.70	17	2.55	32	3.79	9
A-34	1.70	17	2.51	28	4.23	26
Primo	1.71	19	2.23	13	3.62	4
Merion	1.72	20	2.46	19	4.07	18
Vantage	1.75	21	2.54	31	4.18	23
Windsor	1.75	21	2.44	18	3.95	15
PSU K-128	1.75	21	2.47	21	4.67	40
Georgetown	1.76	24	2.46	19	4.27	28
K8-146	1.77	25	2.47	21	4.13	21
NJE P-5	1.78	26	2.58	34	4.22	25
NJE P-114	1.79	27	2.50	25	4.21	24
NJE P-35	1.79	27	2.58	34	3.97	16
Fylking	1.79	27	2.50	25	4.23	27
A-10	1.79	27	2.50	25	5.11	43
WK 408	1.80	31	2.40	17	4.31	30
Belturf	1.80	31	2.52	29	4.15	22
PSU K-107	1.80	31	2.57	33	4.69	41
Sydsport	1.83	34	2.58	34	4.28	29
Pennstar	1.83	34	2.47	21	4.40	35
A-20	1.83	34	2.72	41	4.72	42
Birka	1.84	37	2.60	37	4.33	32
WK 412	1.90	38	2.47	21	4.39	33
Sodco	1.90	38	2.68	40	4.39	33
NJE P-56	1.95	40	2.67	39	4.31	30
Nugget	1.95	40	2.72	41	4.45	37
Aquila	1.97	42	2.65	38	4.49	38
K8-144	2.00	43	2.81	43	4.43	36

Table 9. Winter survival (1970-1971) of Kentucky bluegrass grown in Vermont (9 = no winter kill).

Entry	Mean*	Entry	Mean
Vantage	9.0 A	Park	8.0 A-D
Nugget	9.0 A	NJE P-114	7.7 A-E
Pennstar	9.0 A	Palouse	7.7 A-E
Merion	9.0 A	Georgetown	7.3 A-E
WK-408	9.0 A	PSU K-107	7.3 A-E
NJE P-35	9.0 A	S-21	7.3 A-E
Adelphi	9.0 A	Newport	7.3 A-E
Trenton	9.0 A	K8-144	7.3 A-E
PSU K-162	9.0 A	Delta	7.3 A-E
A-20	9.0 A	Minnesota 6	7.0 A-F
NJE P-5	8.7 AB	Fylking	7.0 A-F
A-34	8.7 AB	A-10	6.3 B-G
Geary	8.7 AB	Zwartberg	6.3 B-G
Birka	8.7 AB	Kenblue	6.0 C-G
Sodco	8.7 AB	K8-146	5.7 D-G
NJE P-56	8.7 AB	Prato	5.7 D-G
Sydsport	8.3 ABC	Cougar	5.3 EFG
Belturf	8.3 ABC	Aquila	4.7 FGH
Windsor	8.3 ABC	S. Dak. Certified	4.3 GHI
Primo	8.0 A-D	Arista	2.7 HI
WK-412	8.0 A-D	Campus	2.3 I
PSU K-128	8.0 A-D		

Means with like letters do not differ significantly from each other.

winter, especially when snow cover is absent and low temperatures persist. For this area it is imperative to use cultivars that will tolerate open winters and produce quality turf during the growing season.

Data obtained from Vermont showed that Campus, Arista, South Dakota Certified, Aquila, Cougar, Prato, K8-146, and Kenblue were less cold-resistant than Vantage, Nugget, Pennstar, Merion, WK-408, NJE P-35, Adelphi, Trenton, PSU K-162, A-20, NJE P-5, A-3 Geary, Birka, Sodco, and NJE P-56 (Table 9). The other Kentucky bluegrasses included in the study survived the low temperatures with only slight apparent injury. Except for South Dakota Certified, the eight cultivars showing winter injury originated from areas of the world characterized by relatively mild winters. Bluegrasses from such origins should be evaluated for winter hardiness before being recommended for areas having severe winter

In general, those entries with low winter survival (Table 9) also ranked low in turf quality (Table 5 and Fig. 1).

SEEDHEAD DEVELOPMENT. The development of inflorescence in Kentucky bluegrass turf is objectionable in certain situations. Seedhead formation is influenced by environment and will vary from year to year. Adverse conditions may cause an increase in inflorescence (which is associated with the curtailing of vegetative growth) and subsequently reduce turf density. Elongated culms supporting seedheads are difficult to mow clean, which further reduces the aesthetics of the turf. The use of Kentucky bluegrass cultivars that tend to produce insignificant quantities of seedheads in the spring may aid in improving turf quality.

Pennsylvania reported that Kentucky bluegrasses varied in inflorescence development under low clipping heights (Table 10).

Table 10. Seedhead counts on Kentucky bluegrass in Pennsylvania in 1970

Entry	Seedhead Count*		Entry	Seedhead Count	
Primo	108	A**	Kenblue	8	DE
Newport	101	AB	Cougar	8	DE
Georgetown	98	AB	Sydsport	8	DE
Trenton	88	ABC	Delta	7	DE
A-20	74	A-D	Minnesota 6	6	E
Campus	66	A-E	Windsor	6	E
Arista	65	A-E	Vantage	6	E
Sodco	38	B-E	Nugget	6	E
Adelphi	26	CDE	NJE P-114	5	E
WK-408	22	DE	S. Dak. Certified	3	E
Merion	18	DE	S-21	3	E
Prato	17	DE	Geary	3	E
WK-412	14	DE	A-10	2	E
Birka	14	DE	A-34	2	E
NJE P-35	13	DE	PSU K-107	2	E
PSU K-128	11	DE	Palouse	2	E
NJE P-56	10	DE	Park	2	E
NJE P-5	10	DE	Pennstar	0	E
PSU K-162	10	DE	Belturf	0	E
Zwartberg	10	DE	Fylking	0	E

* *Average count from 900 cm^2.*

** *Counts with like letters do not differ significantly from each other.*

Primo, Newport, Georgetown, Trenton, A-20, Campus, and Arista produced more seedheads than the majority of the Kentucky bluegrasses included in the Pennsylvania evaluation. Only Pennstar, Belturf, and Fylking did not develop inflorescence.

CONCLUSIONS

A moderate number of attractive, low-growing, turf-type selections did reasonably well at most locations. However, no single selection was outstanding in all tests. Turf density was a major factor in determining turf quality, but genetic color was not a limiting factor. It was established that a genetic-environment interaction exists within the Northeastern Region.

All entries were susceptible to one or more diseases. The erect common types of Kentucky bluegrasses generally were rated below the more decumbent turf types because of susceptibility to helminthosporium leaf spot, the most frequently observed disease. Other diseases that occurred in one or more locations are stripe smut, leaf rust, stem rust, dollar spot, red thread, and powdery mildew. Fusarium blight was noted in several locations, but did not develop significantly in these tests to warrant selection evaluation.

It was determined that compressed thatch thickness was a satisfactory test for determining thatch development. There was more variation of thatch development between selections than between locations. Thatch buildup and fall turf quality were significantly correlated.

Most of the Kentucky bluegrass selections have enough winter tolerance for the Northeastern Region. However, results from Vermont gave indications that certain selections are more winter hardy than others.

Selections included in these tests were shown to vary significantly in inflorescence development. Turf quality was reduced when seedheads formed.

Properly chosen blends of Kentucky bluegrasses may help in

obtaining more consistent long-term performance. Data from these tests should help to determine which selections are most useful in a blend. Nevertheless, much additional work remains to be done to properly choose and evaluate the most appropriate blend for a particular use situation.

Observations on larger turf plots at more locations for longer periods are needed to evaluate Kentucky bluegrasses under the various environmental conditions of the Northeastern Region. Expanded long-term programs and varietal testing under different natural and imposed conditions are required to solve many of the problems encountered.

LITERATURE CITED

Beard, J. B. 1973. Turfgrass: Science and culture. Prentice-Hall, Englewood Cliffs, N.J.

Britton, M. P. 1969. Turfgrass diseases. *In* A. A. Hanson and F. V. Juska (eds.) Turfgrass Science. Agronomy 14:288-335. Am. Soc. of Agron., Madison, Wis.

Cole, Herbert, Jr. 1976. Factors affecting fusarium blight development. Weeds Trees and Turf 15(7):35-37.

Couch, H. B. 1962. Diseases of turfgrasses. Reinhold, New York.

Couch, H. B. 1976. Fusarium blight on turfgrasses--An overview. Weeds Trees and Turf 15(7):8-9, 34-35.

Couch, H. B., and E. R. Bedford. 1966. Fusarium blight on turfgrasses. Phytopathology 56:781-786.

Duich, J. M., and H. B. Musser. 1959. The extent of aberrants produced by Merion Kentucky bluegrass, *Poa pratensis* L., as determined by first and second generation progeny tests. Agron. J. 5:421-424.

Funk, C. R. 1976. Developing genetic resistance to fusarium blight. Weeds Trees and Turf 15(7):41-44.

Gaskin, T. A. 1966. Evidence for physiologic races of stripe smut (*Ustilago striiformis*) attacking Kentucky bluegrass. Plant Dis. Reptr. 50:430-431.

Halisky, P. M., C. R. Funk, and S. Bachelder. 1966. Stripe smut of turf and forage grasses - its prevalence, pathogenicity and response to management practices. Plant Dis. Reptr. 50:294-298.

Halisky, P. M., C. R. Funk, and R. E. Engel. 1966. Melting-out of Kentucky bluegrass varieties by *Helminthosporium vagans* as influenced by turf management practices. Plant Dis. Reptr 50:703-706.

Kreitlow, K. W., and F. V. Juska. 1959. Susceptibility of Merion and other Kentucky bluegrass varieties to stripe smut (*Ustilago striiformis*). Agron. J. 51:596-597.

Madison, J. H. 1970. Principles of turfgrass culture. Van Nostrand Reinhold Co., New York.

Nutter, G. C. 1965. Turf-grass is a $4 billion dollar industry. Turf-Grass Times 1(1):1-22.

Turgeon, A. J. 1976. Effects of cultural practices on fusarium blight incidence in Kentucky bluegrass. Weeds Trees and Turf 15(7):38-40.

APPENDIX

...quality ratings of Kentucky bluegrasses evaluated for 5 years at 11 locations in the Northeastern Region. Data are comparable within locations only.

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
A-10	Mt. Carmel, CONNECTICUT	5.80	6.58	6.83	7.20	6.47	6.10	6.15	7.80
	University Park, PENNSYLVANIA	4.75	4.17	4.13	4.50	4.75	4.63	4.33	7.00
	Nassau County, NEW YORK	. . .	4.00	3.50	4.00	3.50	4.00	3.70	. . .
	Ithaca, NEW YORK	. . .	5.35	4.50	6.30	. . .	7.70	7.70	. . .
	New Brunswick, NEW JERSEY	2.88	2.88	3.08	3.73	3.65	3.85	6.00	3.50
	Kingston, RHODE ISLAND	2.73	3.84	3.38	3.93	5.91	6.91	6.76	6.00
	Fairland, MARYLAND	5.33	4.25	4.15	5.08	5.98	5.15	6.20	6.06
	Burlington, VERMONT	. . .	4.65	4.13	4.40	6.13	6.15	6.00	. . .
	Blacksburg, VIRGINIA	6.76	5.77	6.64	7.61	5.53	7.46	7.71	7.50
	Newport News, VIRGINIA	5.64	4.26	5.46	5.18	6.68	5.04	4.68	5.30
A-20	Mt. Carmel, CONNECTICUT	7.40	8.30	7.95	7.90	7.67	7.65	7.85	8.50
	University Park, PENNSYLVANIA	6.38	7.67	6.88	6.38	6.25	6.63	6.17	7.70
	Nassau County, NEW YORK	. . .	6.00	5.00	5.70	5.50	5.00	5.00	. . .
	Ithaca, NEW YORK	. . .	7.00	6.00	4.50	. . .	6.00	6.30	. . .
	New Brunswick, NEW JERSEY	6.45	6.70	6.00	6.78	7.20	6.85	6.60	6.60
	Kingston, RHODE ISLAND	4.89	7.76	7.34	7.74	7.83	8.20	8.00	7.32
	Fairland, MARYLAND	7.40	7.98	7.00	7.08	7.75	6.83	7.34	7.16
	Burlington, VERMONT	. . .	8.60	7.25	7.28	8.08	8.60	8.93	. . .
	Blacksburg, VIRGINIA	7.73	7.24	6.56	7.31	6.50	6.76	7.76	8.32
	Newport News, VIRGINIA	6.00	5.60	6.74	6.00	6.40	5.34	4.10	5.37
A-34	Mt. Carmel, CONNECTICUT	6.30	6.40	7.00	6.70	6.85	6.30	6.53	7.65
	University Park, PENNSYLVANIA	5.50	7.60	7.40	7.63	7.56	8.13	7.20	7.70
	Nassau County, NEW YORK	. . .	5.35	5.50	5.30	6.30	7.30	5.30	. . .
	Ithaca, NEW YORK	. . .	5.80	6.15	4.20	. . .	5.00	5.30	. . .
	New Brunswick, NEW JERSEY	6.55	6.65	6.53	6.18	6.50	6.85	5.93	6.23
	Kingston, RHODE ISLAND	4.64	7.03	7.13	7.58	7.79	8.01	8.57	7.66
	Fairland, MARYLAND	5.82	6.89	7.75	6.36	7.19	6.01	6.91	6.93
	Centreville, MARYLAND	4.88	4.90	6.54	5.68	5.34	5.48	6.00	6.08
	Burlington, VERMONT	. . .	8.23	6.68	7.10	7.70	8.26	7.80	. . .
	Blacksburg, VIRGINIA	6.94	7.43	6.94	7.10	7.43	6.85	6.54	7.13
	Newport News, VIRGINIA	8.26	7.14	7.32	5.30	6.86	5.86	5.33	6.13

Table 1 continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Adelphi	Mt. Carmel, CONNECTICUT	4.60	5.40	5.82	6.32	5.50	5.63	6.00	6.80
	University Park, PENNSYLVANIA	6.50	7.17	6.80	7.25	7.06	7.63	6.75	6.70
	Kingston, RHODE ISLAND	5.29	6.74	6.81	6.94	7.23	7.60	7.76	7.96
	Fairland, MARYLAND	4.86	6.00	6.50	5.40	6.25	5.04	5.94	6.02
	Centreville, MARYLAND	1.30	1.30	2.70	4.70	4.30	. . .	5.70	6.70
	Burlington, VERMONT	. . .	8.20	6.95	7.00	7.46	7.98	8.20	. . .
	Blacksburg, VIRGINIA	7.44	7.63	7.69	7.70	5.60	8.22	7.56	7.68
Aquila	Nassau County, NEW YORK	. . .	4.50	4.50	5.70	5.85	6.00	4.00	. . .
	Ithaca, NEW YORK	. . .	5.85	5.80	4.35	. . .	4.30	4.70	. . .
	New Brunswick, NEW JERSEY	5.50	5.35	5.55	6.80	7.70	7.50	7.18	6.85
	Kingston, RHODE ISLAND	4.05	5.11	5.05	6.76	7.60	7.56	7.97	7.59
	Fairland, MARYLAND	5.56	6.00	6.11	5.67	6.29	5.18	5.95	6.39
	Centreville, MARYLAND	5.66	5.12	6.55	5.40	5.38	5.25	6.18	6.60
	Burlington, VERMONT	. . .	6.65	5.45	5.36	6.64	7.08	7.78	. . .
	Blacksburg, VIRGINIA	5.99	6.61	6.04	7.86	6.17	7.38	7.03	7.53
	Newport News, VIRGINIA	6.92	6.00	6.77	5.15	5.86	5.08	4.85	5.90
Arista	Mt. Carmel, CONNECTICUT	5.70	5.38	6.50	6.48	5.78	5.53	6.03	7.30
	University Park, PENNSYLVANIA	5.00	6.67	6.60	6.50	6.68	6.75	7.00	7.70
	Nassau County, NEW YORK	. . .	3.50	4.50	4.70	5.00	5.00	5.70	. . .
	Ithaca, NEW YORK	. . .	5.15	5.35	6.00	. . .	5.70	5.30	. . .
	New Brunswick, NEW JERSEY	2.63	2.93	3.03	3.23	5.20	5.50	4.35	3.85
	Kingston, RHODE ISLAND	2.41	3.20	4.14	5.90	6.91	7.40	7.36	6.84
	Fairland, MARYLAND	4.59	5.69	5.79	5.60	6.38	5.32	5.99	6.09
	Centreville, MARYLAND	4.52	4.54	5.74	5.34	4.40	3.58	4.00	4.75
	Burlington, VERMONT	. . .	4.13	4.23	4.74	5.04	4.92	6.10	. . .
	Blacksburg, VIRGINIA	4.74	5.76	6.81	7.41	6.87	7.32	6.70	6.48
	Newport News, VIRGINIA	6.18	5.60	6.40	4.20	5.60	3.92	3.68	4.87
Belturf	Mt. Carmel, CONNECTICUT	7.10	6.70	7.24	7.24	6.93	6.53	6.77	8.00
	University Park, PENNSYLVANIA	5.50	7.17	6.20	6.13	5.50	5.38	6.00	5.00

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Belturf	Kingston, RHODE ISLAND	3.70	4.43	5.10	6.53	7.97	8.12	8.20	7.41
(contd.)	Fairland, MARYLAND	4.97	5.99	5.88	5.79	6.88	5.76	6.49	6.22
	Centreville, MARYLAND	5.34	5.34	6.52	6.00	5.72	5.92	6.73	6.58
	Burlington, VERMONT	. . .	7.00	6.00	7.24	7.92	7.94	8.35	. . .
	Blacksburg, VIRGINIA	6.53	7.04	7.13	7.01	7.10	7.55	7.24	7.15
	Newport News, VIRGINIA	6.34	5.08	5.88	5.30	6.60	5.52	5.75	5.80
Birka	Mt. Carmel, CONNECTICUT	6.40	6.36	6.72	6.86	6.95	6.47	6.43	7.15
	University Park, PENNSYLVANIA	5.50	7.33	7.10	7.38	7.62	7.63	7.63	7.70
	Nassau County, NEW YORK	. . .	6.15	6.50	6.30	6.50	6.00	5.00	. . .
	Ithaca, NEW YORK	. . .	5.50	6.00	4.15	. . .	3.30	4.70	. . .
	New Brunswick, NEW JERSEY	6.97	6.43	6.43	6.60	7.70	7.00	6.87	6.23
	Kingston, RHODE ISLAND	4.09	6.34	6.66	7.41	7.64	7.91	7.68	7.04
	Fairland, MARYLAND	5.47	6.59	6.86	5.95	6.70	5.82	6.48	6.58
	Centreville, MARYLAND	4.92	4.98	6.26	5.94	5.48	5.58	5.90	5.75
	Burlington, VERMONT	. . .	8.03	5.80	5.80	7.16	7.46	8.25	. . .
	Blacksburg, VIRGINIA	6.57	7.19	7.26	7.50	6.17	6.88	7.27	7.10
	Newport News, VIRGINIA	7.26	6.82	7.88	5.50	7.32	6.14	5.40	5.90
Campus	Mt. Carmel, CONNECTICUT	5.70	5.66	6.52	6.58	6.63	5.80	6.40	6.90
	University Park, PENNSYLVANIA	5.38	6.40	6.00	6.50	6.60	6.75	6.88	7.00
	New Brunswick, NEW JERSEY	3.10	3.13	3.38	3.75	5.20	6.00	4.53	4.00
	Kingston, RHODE ISLAND	2.75	3.93	4.63	6.36	7.29	7.70	7.68	7.20
	Fairland, MARYLAND	4.12	5.86	5.90	5.40	5.98	4.86	5.58	5.72
	Burlington, VERMONT	. . .	4.15	4.38	5.12	5.40	5.52	5.48	. . .
	Blacksburg, VIRGINIA	4.76	5.83	6.61	7.76	7.10	7.20	6.43	6.28
Cougar	Mt. Carmel, CONNECTICUT	5.40	5.94	6.22	6.70	6.45	5.83	6.17	7.25
	University Park, PENNSYLVANIA	5.13	4.33	5.80	5.13	6.30	6.63	6.50	7.00
	Nassau County, NEW YORK	. . .	4.00	4.70	4.70	5.00	6.00	5.00	. . .
	Ithaca, NEW YORK	. . .	5.85	6.00	4.65	. . .	3.30	5.00	. . .
	New Brunswick, NEW JERSEY	3.00	2.95	3.25	3.80	5.00	5.65	4.98	4.55
	Kingston, RHODE ISLAND	2.75	3.63	4.24	5.90	7.18	7.48	7.57	6.51

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Cougar	Fairland, MARYLAND	4.33	5.37	5.50	5.29	5.95	5.61	5.98	6.00
(contd.)	Centreville, MARYLAND	4.68	4.94	6.62	5.88	5.00	4.73	5.43	5.53
	Burlington, VERMONT	. . .	6.00	5.60	5.40	6.40	6.86	7.48	. . .
	Blacksburg, VIRGINIA	5.90	6.17	6.35	7.41	5.50	6.75	6.56	6.55
	Newport News, VIRGINIA	6.36	5.74	6.88	4.80	6.00	5.14	4.08	6.00
Delta	Mt. Carmel, CONNECTICUT	5.70	5.58	5.74	6.30	6.08	5.47	5.93	7.15
	University Park, PENNSYLVANIA	4.75	3.33	4.10	4.12	3.70	4.00	5.00	4.30
	Nassau County, NEW YORK	. . .	3.00	2.30	3.00	3.15	3.00	3.00	. . .
	Ithaca, NEW YORK	. . .	4.85	5.65	5.65	. . .	5.30	5.70	. . .
	New Brunswick, NEW JERSEY	2.38	2.25	2.30	2.18	2.35	2.30	2.48	2.18
	Kingston, RHODE ISLAND	3.01	4.96	4.03	4.87	5.23	5.93	6.90	5.88
	Fairland, MARYLAND	4.93	4.74	4.91	4.93	5.55	4.53	4.80	5.34
	Centreville, MARYLAND	5.28	5.02	5.26	5.66	5.00	4.90	5.25	5.08
	Burlington, VERMONT	. . .	6.10	4.33	4.62	5.68	6.28	6.98	. . .
	Blacksburg, VIRGINIA	6.61	6.13	6.63	6.37	4.90	6.18	7.10	7.15
	Newport News, VIRGINIA	5.68	5.20	6.26	4.85	5.86	4.80	5.10	5.33
Fylking	Mt. Carmel, CONNECTICUT	6.90	6.58	6.68	5.96	6.80	6.23	6.50	7.15
	University Park, PENNSYLVANIA	5.50	7.40	7.50	7.68	7.50	7.80	7.80	7.70
	Nassau County, NEW YORK	. . .	5.50	5.35	5.70	6.20	6.00	5.30	. . .
	Ithaca, NEW YORK	. . .	5.30	7.35	5.15	. . .	4.00	4.60	. . .
	New Brunswick, NEW JERSEY	6.20	7.13	6.85	6.93	7.35	7.50	6.98	6.93
	Kingston, RHODE ISLAND	3.53	5.86	6.47	7.53	7.60	7.37	7.24	6.64
	Fairland, MARYLAND	5.37	6.73	7.33	6.03	6.61	5.46	6.26	6.50
	Centreville, MARYLAND	4.34	4.68	5.62	5.06	4.40	4.10	4.75	4.68
	Burlington, VERMONT	. . .	7.18	6.43	6.46	7.08	7.60	8.00	. . .
	Blacksburg, VIRGINIA	7.06	6.94	6.85	7.99	7.30	7.32	6.84	7.05
	Newport News, VIRGINIA	7.38	6.80	7.74	5.50	6.19	5.28	5.50	5.90
Geary	Mt. Carmel, CONNECTICUT	6.80	5.98	6.28	6.56	5.98	6.00	5.57	6.75
	University Park, PENNSYLVANIA	5.13	5.00	5.00	4.75	5.00	5.50	5.63	6.00
	Nassau County, NEW YORK	. . .	3.15	3.00	3.30	3.20	4.00	3.00	. . .

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Geary (contd.)	Fairland, MARYLAND	5.32	5.05	4.50	5.07	6.11	5.70	6.29	6.15
	Centreville, MARYLAND	5.48	4.74	5.68	5.20	5.26	4.93	5.00	5.15
	Burlington, VERMONT	. . .	6.53	4.60	5.18	6.34	6.66	7.53	. . .
	Blacksburg, VIRGINIA	6.23	5.37	6.03	5.83	5.67	6.68	6.41	6.43
	Newport News, VIRGINIA	5.68	4.68	6.08	4.80	6.66	6.38	5.43	6.23
George-town	Mt. Carmel, CONNECTICUT	5.40	5.84	6.24	6.32	6.08	5.47	6.03	7.65
	University Park, PENNSYLVANIA	6.13	7.50	7.20	6.88	6.86	6.98	7.45	7.70
	Nassau County, NEW YORK	. . .	5.30	4.65	4.00	4.85	5.00	4.30	. . .
	Ithaca, NEW YORK	. . .	6.15	6.30	5.00	. . .	5.30	5.30	. . .
	New Brunswick, NEW JERSEY	6.18	5.25	4.48	4.23	5.50	6.35	5.05	5.38
	Kingston, RHODE ISLAND	5.05	6.50	6.37	7.04	7.00	7.44	8.04	7.61
	Fairland, MARYLAND	5.99	6.88	6.86	5.50	6.30	5.86	6.94	6.86
	Centreville, MARYLAND	6.33	6.08	6.60	5.83	5.65	5.50	6.57	6.13
	Burlington, VERMONT	. . .	7.20	7.20	6.80	7.30	7.80	7.68	. . .
	Blacksburg, VIRGINIA	7.04	6.89	6.81	6.90	7.43	7.48	6.81	7.85
	Newport News, VIRGINIA	7.62	6.46	7.28	5.00	6.40	5.20	5.43	6.23
K8-144	Nassau County, NEW YORK	. . .	5.50	5.35	5.30	6.00	5.00	5.00	. . .
	Ithaca, NEW YORK	. . .	5.15	5.35	4.35	. . .	5.70	5.30	. . .
	New Brunswick, NEW JERSEY	5.68	5.28	5.20	6.60	7.85	7.90	7.25	6.95
	Kingston, RHODE ISLAND	4.10	5.24	5.07	6.51	7.41	7.66	7.93	7.49
	Fairland, MARYLAND	5.54	6.17	6.08	5.66	6.35	5.33	5.99	6.49
	Centreville, MARYLAND	5.50	5.40	6.34	5.60	5.14	5.43	6.33	6.15
	Burlington, VERMONT	. . .	6.85	5.60	5.28	6.20	6.80	7.65	. . .
	Blacksburg, VIRGINIA	6.51	6.81	6.69	7.74	6.10	6.98	6.43	7.02
	Newport News, VIRGINIA	7.06	6.34	7.14	5.15	6.12	5.52	5.18	6.13
K8-146	Nassau County, NEW YORK	. . .	5.00	5.00	6.00	5.00	4.00	4.70	. . .
	Ithaca, NEW YORK	. . .	5.50	5.65	3.65	. . .	3.30	4.70	. . .
	New Brunswick, NEW JERSEY	5.38	5.20	5.38	6.63	7.50	7.50	7.23	6.75
	Kingston, RHODE ISLAND	3.96	5.03	4.90	6.77	7.23	7.65	7.90	7.24
	Fairland, MARYLAND	5.50	6.22	6.53	5.71	6.30	5.47	6.29	6.26
	Centreville, MARYLAND	5.66	5.12	6.40	5.50	5.66	5.33	6.28	6.43

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
K8-146 (contd.)	Burlington, VERMONT	. . .	6.05	4.85	5.02	6.36	6.64	7.05	. . .
	Blacksburg, VIRGINIA	6.04	7.16	6.46	7.80	5.77	6.98	6.33	7.32
	Newport News, VIRGINIA	7.26	5.54	7.06	5.35	6.38	5.00	4.85	6.43
Kenblue	Mt. Carmel, CONNECTICUT	7.20	6.48	6.36	6.84	6.85	6.33	6.30	7.40
	University Park, PENNSYLVANIA	5.25	4.23	4.70	3.63	4.00	5.00	5.75	6.30
	Nassau County, NEW YORK	. . .	4.35	3.85	3.70	4.30	4.00	4.00	. . .
	Ithaca, NEW YORK	. . .	4.50	4.30	5.20	. . .	6.00	5.00	. . .
	New Brunswick, NEW JERSEY	3.30	2.33	2.38	2.63	3.35	3.50	3.53	3.65
	Kingston, RHODE ISLAND	3.38	3.71	3.16	4.61	5.93	6.76	7.07	5.88
	Fairland, MARYLAND	5.17	4.83	4.23	4.82	5.79	5.66	6.41	6.31
	Centreville, MARYLAND	5.60	4.80	6.02	5.32	5.20	5.50	6.43	5.90
	Burlington, VERMONT	. . .	6.05	4.70	5.28	6.30	6.82	7.15	. . .
	Blacksburg, VIRGINIA	6.23	5.39	5.93	6.76	6.33	6.92	6.74	6.98
	Newport News, VIRGINIA	4.98	3.52	5.48	4.85	6.54	6.26	5.83	5.10
Merion	Mt. Carmel, CONNECTICUT	5.70	6.16	6.10	6.70	6.03	6.27	6.40	7.25
	University Park, PENNSYLVANIA	5.50	7.67	7.50	7.63	6.90	6.38	7.75	7.30
	Nassau County, NEW YORK	. . .	6.15	5.65	6.00	6.50	7.00	5.30	. . .
	Ithaca, NEW YORK	. . .	5.50	5.30	4.20	. . .	3.70	5.00	. . .
	New Brunswick, NEW JERSEY	3.98	4.15	4.13	5.05	6.65	6.50	5.05	4.70
	Kingston, RHODE ISLAND	4.16	7.01	6.33	7.52	7.94	7.96	7.46	7.01
	Fairland, MARYLAND	6.01	7.10	7.45	6.24	6.70	6.07	7.05	6.87
	Centreville, MARYLAND	4.98	5.00	5.54	5.72	5.34	5.50	4.75	4.50
	Burlington, VERMONT	. . .	8.48	6.98	7.56	8.12	8.36	8.48	. . .
	Blacksburg, VIRGINIA	6.67	6.99	6.79	6.23	6.10	7.53	6.97	7.03
	Newport News, VIRGINIA	7.18	6.18	7.66	6.00	6.92	6.14	5.40	5.90
Minne-sota 6	Mt. Carmel, CONNECTICUT	7.40	6.46	6.82	7.06	7.03	6.17	6.33	7.65
	University Park, PENNSYLVANIA	4.88	4.33	4.00	4.38	4.80	5.13	5.25	6.00
	Nassau County, NEW YORK	. . .	2.85	3.35	3.30	3.80	4.00	4.00	. . .
	Ithaca, NEW YORK	. . .	4.50	4.50	5.65	. . .	6.70	5.30	. . .
	Kingston, RHODE ISLAND	2.24	3.02	3.19	4.00	5.76	6.06	6.56	5.00

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Minne-	Centreville, MARYLAND	4.88	4.66	5.84	5.40	5.12	5.43	5.33	5.43
sota 6	Burlington, VERMONT	. . .	6.55	4.98	5.16	7.42	7.22	7.43	. . .
(contd.)	Blacksburg, VIRGINIA	6.37	5.56	6.30	6.29	5.30	6.27	6.43	6.87
	Newport News, VIRGINIA	5.28	3.92	6.00	4.85	6.46	5.94	5.53	5.33
Newport	Mt. Carmel, CONNECTICUT	5.60	5.78	5.92	6.44	5.35	5.56	5.50	7.00
	University Park, PENNSYLVANIA	5.75	6.73	6.40	6.20	6.60	6.70	7.30	7.38
	Nassau County, NEW YORK	. . .	4.20	4.00	3.70	5.15	5.00	4.00	. . .
	Ithaca, NEW YORK	. . .	4.85	5.20	4.50	. . .	6.30	5.70	. . .
	New Brunswick, NEW JERSEY	3.08	3.13	3.05	2.70	4.15	3.15	2.35	2.23
	Kingston, RHODE ISLAND	3.48	4.59	4.18	5.86	6.57	6.88	7.26	6.29
	Fairland, MARYLAND	5.47	5.78	5.75	5.91	6.86	6.06	6.70	6.59
	Centreville, MARYLAND	5.22	4.88	5.60	5.86	5.42	5.20	5.45	5.50
	Burlington, VERMONT	. . .	6.18	4.63	4.74	5.84	5.88	7.10	. . .
	Blacksburg, VIRGINIA	6.04	5.70	6.41	7.04	6.63	7.25	6.79	6.88
	Newport News, VIRGINIA	6.66	5.94	6.68	4.50	6.54	5.94	5.08	6.10
NJE P-5	Mt. Carmel, CONNECTICUT	4.80	5.16	5.70	5.80	5.48	5.33	5.50	6.75
	University Park, PENNSYLVANIA	6.13	7.33	6.40	7.25	7.06	7.63	7.63	6.00
	New Brunswick, NEW JERSEY	5.90	6.38	6.18	6.40	6.85	6.70	5.48	5.53
	Kingston, RHODE ISLAND	4.66	6.13	6.24	6.53	6.80	7.30	7.73	7.54
	Fairland, MARYLAND	4.39	5.29	6.15	5.70	6.61	5.09	5.36	5.86
	Centreville, MARYLAND	4.94	4.46	5.78	5.14	4.94	5.18	5.68	5.40
	Burlington, VERMONT	. . .	8.13	6.70	6.24	6.94	7.54	8.05	. . .
	Blacksburg, VIRGINIA	6.89	7.46	7.46	7.19	7.17	7.58	7.64	7.22
	Newport News, VIRGINIA	7.30	6.80	7.26	5.00	6.68	5.72	4.48	6.23
NJE P-35	Mt. Carmel, CONNECTICUT	6.50	6.24	6.78	6.70	6.70	5.93	6.67	6.80
	University Park, PENNSYLVANIA	5.88	7.83	7.10	7.25	6.96	7.33	7.00	5.70
	Kingston, RHODE ISLAND	5.00	6.68	6.43	7.17	7.74	8.01	8.50	7.83
	Fairland, MARYLAND	4.86	6.38	6.85	5.54	6.58	5.06	6.20	6.06
	Burlington, VERMONT	. . .	8.10	6.80	6.96	7.84	8.34	8.25	. . .
	Blacksburg, VIRGINIA	7.07	6.96	7.16	7.37	6.33	7.48	6.43	7.10
NJE P-56	Mt. Carmel, CONNECTICUT	4.40	5.10	5.52	6.00	5.88	5.00	6.00	7.05
	University Park, PENNSYLVANIA	5.13	7.87	7.10	7.63	7.58	8.00	7.88	7.00
	Nassau County, NEW YORK	. . .	5.85	5.70	6.30	5.35	5.00	5.00	. . .

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
NJE P-56	Ithaca, NEW YORK	. . .	6.50	7.50	6.50	. . .	7.00	7.70	. . .
(contd.)	New Brunswick, NEW JERSEY	5.78	6.80	6.75	7.53	7.65	7.65	7.08	6.68
	Kingston, RHODE ISLAND	4.45	6.84	7.62	8.02	7.87	8.04	8.44	8.08
	Fairland, MARYLAND	4.49	5.35	6.05	5.40	6.29	4.89	5.56	5.76
	Centreville, MARYLAND	4.74	4.68	5.60	4.84	4.66	4.75	5.53	5.25
	Burlington, VERMONT	. . .	8.15	7.00	6.28	7.22	7.72	8.08	. . .
	Blacksburg, VIRGINIA	7.07	7.47	7.76	8.13	6.57	7.98	7.24	7.70
	Newport News, VIRGINIA	6.84	5.80	6.32	5.00	6.12	4.94	4.50	5.66
NJE P-114	Mt. Carmel, CONNECTICUT	5.40	5.52	6.22	6.34	6.23	5.87	6.43	7.65
	University Park, PENNSYLVANIA	5.38	7.66	6.70	7.50	7.16	7.63	7.50	7.00
	Nassau County, NEW YORK	. . .	5.85	5.35	5.70	5.85	5.30	4.70	. . .
	Ithaca, NEW YORK	. . .	6.35	6.70	5.50	. . .	7.00	6.00	. . .
	New Brunswick, NEW JERSEY	6.68	6.95	6.90	6.25	7.35	7.50	5.80	6.00
	Kingston, RHODE ISLAND	5.16	7.34	7.04	7.63	7.76	7.62	8.07	8.33
	Fairland, MARYLAND	4.63	5.73	6.16	5.40	6.11	5.03	5.59	5.87
	Centreville, MARYLAND	5.00	4.80	5.92	5.34	5.00	5.00	5.43	5.35
	Burlington, VERMONT	. . .	8.10	6.95	7.12	7.44	7.98	8.35	. . .
	Blacksburg, VIRGINIA	7.25	7.87	7.19	7.90	5.97	7.93	7.49	7.88
Nugget	Mt. Carmel, CONNECTICUT	5.30	5.40	5.80	6.14	5.43	5.77	5.87	7.25
	University Park, PENNSYLVANIA	3.25	8.57	8.34	8.25	6.98	6.25	6.75	8.00
	Nassau County, NEW YORK	. . .	6.80	7.35	7.70	7.00	7.00	6.00	. . .
	Ithaca, NEW YORK	. . .	6.00	6.65	3.50	. . .	4.30	5.00	. . .
	New Brunswick, NEW JERSEY	4.35	7.38	8.05	5.73	7.00	7.35	5.45	5.15
	Kingston, RHODE ISLAND	2.49	6.21	8.14	8.37	7.57	7.30	7.12	6.83
	Fairland, MARYLAND	3.35	5.41	6.54	5.36	5.95	4.48	5.15	5.52
	Centreville, MARYLAND	4.06	4.06	6.20	5.20	4.74	4.58	5.25	5.55
	Burlington, VERMONT	. . .	8.25	8.10	7.68	7.74	7.82	7.83	. . .
	Blacksburg, VIRGINIA	5.23	7.70	6.38	6.56	5.63	6.73	6.37	6.88
Palouse	Mt. Carmel, CONNECTICUT	6.20	5.82	6.22	6.52	6.43	5.70	5.90	7.00

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Palouse (contd.)	Ithaca, NEW YORK	. . .	4.35	4.30	5.30	. . .	5.70	5.00	. . .
	New Brunswick, NEW JERSEY	3.20	2.60	2.38	2.88	3.20	3.00	3.40	3.58
	Kingston, RHODE ISLAND	3.04	4.54	2.89	3.93	5.45	6.29	6.77	5.69
	Fairland, MARYLAND	5.43	5.19	4.56	5.24	6.28	5.88	6.49	6.30
	Centreville, MARYLAND	5.14	4.52	5.88	5.14	4.86	4.58	4.43	4.88
	Burlington, VERMONT	. . .	5.95	4.28	4.50	5.88	6.60	7.15	. . .
	Blacksburg, VIRGINIA	5.97	5.13	6.00	6.57	5.67	6.98	6.33	6.72
	Newport News, VIRGINIA	5.60	4.36	5.74	4.35	6.32	5.54	4.90	5.00
Park	Mt. Carmel, CONNECTICUT	5.40	5.82	5.84	6.28	5.95	5.30	5.47	6.75
	University Park, PENNSYLVANIA	5.13	5.67	5.20	5.00	5.50	5.38	6.38	7.00
	Nassau County, NEW YORK	. . .	2.80	3.00	3.00	3.35	3.00	3.00	. . .
	Ithaca, NEW YORK	. . .	4.15	4.65	5.00	. . .	6.00	5.30	. . .
	New Brunswick, NEW JERSEY	3.48	2.48	2.20	3.33	3.50	4.00	3.58	3.75
	Kingston, RHODE ISLAND	3.10	4.68	3.51	4.46	5.73	6.04	6.81	6.04
	Fairland, MARYLAND	5.82	5.32	4.34	5.30	6.10	5.69	6.33	6.13
	Centreville, MARYLAND	4.86	4.60	5.72	5.00	4.66	4.25	4.45	4.93
	Burlington, VERMONT	. . .	6.10	4.30	4.44	5.74	6.42	6.50	. . .
	Blacksburg, VIRGINIA	6.00	5.53	5.35	5.56	5.40	6.73	6.84	6.53
	Newport News, VIRGINIA	5.54	4.42	6.00	4.65	6.48	5.20	4.90	5.67
Pennstar	Mt. Carmel, CONNECTICUT	6.90	6.44	6.78	6.92	6.68	6.13	5.90	7.05
	University Park, PENNSYLVANIA	5.43	7.63	7.50	7.68	7.56	7.75	7.75	7.80
	Nassau County, NEW YORK	. . .	4.65	4.50	5.00	5.50	6.00	4.30	. . .
	Ithaca, NEW YORK	. . .	5.35	6.80	5.70	. . .	4.30	5.00	. . .
	New Brunswick, NEW JERSEY	5.88	6.78	6.88	6.88	7.15	7.15	6.65	6.58
	Kingston, RHODE ISLAND	3.33	5.65	6.74	7.60	7.46	7.43	7.11	6.79
	Fairland, MARYLAND	4.82	6.20	7.28	5.61	6.34	5.05	5.63	5.95
	Centreville, MARYLAND	4.34	4.14	5.54	4.98	4.60	3.93	5.08	5.25
	Burlington, VERMONT	. . .	7.88	6.80	6.50	7.30	7.52	8.00	. . .
	Blacksburg, VIRGINIA	6.94	7.74	6.94	7.64	6.66	6.98	6.23	7.10
	Newport News, VIRGINIA	7.46	6.80	7.20	4.80	5.80	4.40	5.00	5.67
Prato	Mt. Carmel, CONNECTICUT	6.70	6.30	6.54	6.60	6.38	6.33	6.27	7.50
	University Park, PENNSYLVANIA	5.50	5.33	5.20	5.63	5.92	6.00	6.50	7.30
	Nassau County, NEW YORK	. . .	3.85	3.85	5.00	5.50	6.00	5.00	. . .

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Prato (contd.)	Ithaca, NEW YORK	. . .	6.50	6.15	5.65	. . .	4.00	4.70	. . .
	New Brunswick, NEW JERSEY	2.95	2.88	3.15	3.30	5.00	4.50	3.65	3.10
	Kingston, RHODE ISLAND	2.16	3.00	4.19	5.43	6.74	7.20	7.10	6.10
	Fairland, MARYLAND	4.43	5.30	5.10	5.16	6.16	5.23	5.99	5.79
	Centreville, MARYLAND	4.80	4.68	5.94	5.40	5.20	4.85	5.68	5.23
	Burlington, VERMONT	. . .	5.78	5.13	5.54	6.80	6.84	7.33	. . .
	Blacksburg, VIRGINIA	5.40	5.60	6.03	7.80	6.00	6.50	6.80	6.10
	Newport News, VIRGINIA	6.22	5.26	6.08	4.50	5.80	4.72	4.60	5.57
Primo	Mt. Carmel, CONNECTICUT	6.00	6.00	6.68	7.08	6.53	6.47	6.10	7.15
	University Park, PENNSYLVANIA	5.63	6.50	6.40	6.25	6.60	7.00	7.50	7.70
	Nassau County, NEW YORK	. . .	4.30	3.80	6.30	5.00	5.00	4.00	. . .
	Ithaca, NEW YORK	. . .	5.00	5.30	4.35	. . .	4.70	5.00	. . .
	New Brunswick, NEW JERSEY	3.10	3.43	3.35	3.58	4.00	3.85	4.08	3.93
	Kingston, RHODE ISLAND	2.55	4.29	4.94	6.38	7.28	7.57	7.59	6.34
	Fairland, MARYLAND	4.95	5.89	6.29	6.00	6.96	6.03	6.57	6.42
	Centreville, MARYLAND	4.58	4.54	5.72	5.12	4.72	4.68	4.60	4.40
	Burlington, VERMONT	. . .	6.33	4.45	4.52	5.88	6.56	7.35	. . .
	Blacksburg, VIRGINIA	6.46	6.17	6.59	7.17	5.20	6.82	7.33	7.10
	Newport News, VIRGINIA	7.22	6.52	6.52	5.00	5.60	4.18	3.65	5.00
PSU K-107	Mt. Carmel, CONNECTICUT	6.60	5.92	6.22	6.82	6.68	5.83	6.47	7.15
	University Park, PENNSYLVANIA	5.62	7.33	7.20	7.38	7.52	7.68	7.50	7.40
	Nassau County, NEW YORK	. . .	6.15	5.80	5.30	5.50	6.00	5.30	. . .
	Ithaca, NEW YORK	. . .	4.80	5.80	5.20	. . .	5.00	5.00	. . .
	New Brunswick, NEW JERSEY	6.05	6.85	6.90	6.85	8.00	7.35	6.80	6.40
	Kingston, RHODE ISLAND	3.53	6.01	6.48	7.43	7.50	7.38	7.42	6.66
	Fairland, MARYLAND	5.19	6.39	6.90	5.65	6.25	5.40	6.13	6.32
	Centreville, MARYLAND	4.54	4.46	5.54	5.20	4.86	4.70	5.25	4.93
	Burlington, VERMONT	. . .	7.20	6.33	6.00	6.78	6.92	7.45	. . .
	Blacksburg, VIRGINIA	6.67	7.44	6.64	7.61	6.40	7.13	6.81	7.05
PSU K-128	University Park, PENNSYLVANIA	5.13	7.77	7.40	7.25	7.32	7.70	7.58	7.00
	New Brunswick, NEW JERSEY	6.33	6.63	6.43	6.40	6.85	7.00	6.70	6.15

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
PSU K-162	Mt. Carmel, CONNECTICUT	6.00	5.94	6.12	6.26	6.13	6.07	5.93	6.65
	University Park, PENNSYLVANIA	4.50	5.17	5.00	5.38	5.60	6.25	6.75	6.30
	New Brunswick, NEW JERSEY	6.30	4.33	4.55	5.45	6.00	5.15	5.23	5.38
	Kingston, RHODE ISLAND	3.73	5.15	4.26	6.08	6.60	6.80	6.92	5.93
	Fairland, MARYLAND	5.72	5.40	5.30	4.90	6.23	5.34	6.32	5.94
	Burlington, VERMONT	. . .	7.55	5.88	5.94	6.78	7.04	7.45	. . .
S-21	Mt. Carmel, CONNECTICUT	6.00	6.18	6.12	6.50	6.28	5.93	5.83	7.00
	University Park, PENNSYLVANIA	5.88	4.33	4.70	4.63	5.00	5.13	5.38	6.70
	Nassau County, NEW YORK	. . .	3.35	3.00	3.30	3.35	3.00	3.30	. . .
	Ithaca, NEW YORK	. . .	3.85	4.50	4.85	. . .	4.70	5.00	. . .
	New Brunswick, NEW JERSEY	3.23	2.33	2.30	2.88	3.30	3.50	3.70	3.73
	Kingston, RHODE ISLAND	3.05	4.61	3.19	4.50	5.50	6.15	6.55	5.74
	Fairland, MARYLAND	5.59	5.06	4.43	5.22	6.35	5.85	6.68	6.35
	Centreville, MARYLAND	5.20	5.06	5.54	5.48	5.06	4.65	4.58	4.93
	Burlington, VERMONT	. . .	6.35	4.73	5.32	6.42	7.30	7.55	. . .
	Blacksburg, VIRGINIA	6.09	5.44	6.19	6.50	6.43	6.77	6.91	6.93
	Newport News, VIRGINIA	5.90	4.28	5.80	4.50	6.58	6.00	4.90	5.57
Sodco	Mt. Carmel, CONNECTICUT	5.90	5.86	6.10	6.58	6.10	6.17	6.20	7.25
	University Park, PENNSYLVANIA	6.00	6.73	6.80	7.13	7.26	7.00	7.25	7.00
	Nassau County, NEW YORK	. . .	5.50	6.30	5.30	6.20	5.00	6.00	. . .
	Ithaca, NEW YORK	. . .	6.00	5.65	5.35	. . .	6.00	6.30	. . .
	New Brunswick, NEW JERSEY	6.18	6.80	6.85	7.20	6.85	7.15	7.40	7.03
	Kingston, RHODE ISLAND	4.15	6.16	6.30	7.61	7.91	8.04	7.97	7.53
	Fairland, MARYLAND	4.95	5.59	6.18	5.59	6.60	5.80	6.26	6.44
	Centreville, MARYLAND	4.68	4.60	6.26	5.40	5.06	5.40	5.83	5.50
	Burlington, VERMONT	. . .	7.30	6.55	6.50	7.64	7.86	8.18	. . .
	Blacksburg, VIRGINIA	7.04	7.33	7.03	7.60	6.87	7.42	7.80	7.43
	Newport News, VIRGINIA	7.26	6.26	7.28	5.70	7.34	6.32	5.60	6.77
S. Dak. Certified	Mt. Carmel, CONNECTICUT	6.30	5.78	6.16	6.70	6.68	6.23	6.17	6.90
	University Park, PENNSYLVANIA	4.88	3.33	3.60	3.63	3.74	4.25	5.13	5.20
	Nassau County, NEW YORK	. . .	2.85	3.00	3.00	3.15	4.00	4.00	. . .
	Ithaca, NEW YORK	. . .	4.00	4.30	4.35	. . .	6.00	5.00	. . .
	New Brunswick, NEW JERSEY	2.55	1.83	1.83	1.73	2.00	3.15	2.45	2.23
	Kingston, RHODE ISLAND	. . .	. . .	1.70	3.35	3.80	5.15	5.85	4.35

Table i continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
S. Dak. Certified (contd.)	Fairland, MARYLAND	5.05	4.98	4.46	4.84	5.56	5.51	6.16	5.76
	Centreville, MARYLAND	5.12	4.82	5.46	5.28	5.02	4.50	5.15	4.85
	Burlington, VERMONT	. . .	5.05	3.88	4.10	5.94	6.28	6.48	. . .
	Blacksburg, VIRGINIA	6.69	5.41	5.81	6.10	4.00	6.62	5.91	6.98
	Newport News, VIRGINIA	4.76	3.46	4.94	4.50	5.64	5.60	5.35	5.53
Sydsport	Mt. Carmel, CONNECTICUT	4.50	5.78	6.53	6.60	6.38	6.23	6.10	7.75
	University Park, PENNSYLVANIA	5.38	7.33	7.24	7.25	6.88	7.00	7.45	8.00
	Nassau County, NEW YORK	. . .	5.85	5.00	6.00	6.20	6.00	5.00	. . .
	Ithaca, NEW YORK	. . .	6.00	5.35	3.85	. . .	3.70	5.30	. . .
	New Brunswick, NEW JERSEY	6.10	6.25	6.35	6.13	6.50	6.35	5.55	5.78
	Kingston, RHODE ISLAND	4.18	6.59	6.68	7.53	8.08	7.54	8.40	7.70
	Fairland, MARYLAND	5.16	6.54	7.53	6.03	6.66	5.12	5.85	6.17
	Centreville, MARYLAND	4.72	5.02	6.40	6.12	5.54	5.33	5.73	6.25
	Burlington, VERMONT	. . .	7.55	7.00	6.44	7.40	7.76	7.88	. . .
	Blacksburg, VIRGINIA	6.79	7.51	6.51	6.91	6.20	6.68	6.39	7.18
	Newport News, VIRGINIA	7.98	7.48	8.02	6.50	8.02	6.86	5.98	7.43
Trenton	Mt. Carmel, CONNECTICUT	5.60	6.06	6.38	6.80	6.18	5.97	6.27	7.15
	University Park, PENNSYLVANIA	5.00	7.00	6.90	7.38	7.12	7.75	7.50	7.70
	Kingston, RHODE ISLAND	5.59	7.21	6.80	7.24	7.73	8.14	8.43	7.95
	Fairland, MARYLAND	6.00	7.00	6.58	5.54	6.40	5.38	6.26	6.94
	Burlington, VERMONT	. . .	8.10	7.20	7.16	7.64	8.22	8.40	. . .
Vantage	Mt. Carmel, CONNECTICUT	5.80	5.30	5.72	6.12	5.58	6.03	6.50	6.50
	University Park, PENNSYLVANIA	5.38	7.33	6.90	7.00	6.74	6.88	6.63	6.00
	Nassau County, NEW YORK	. . .	5.00	4.00	4.00	4.50	5.00	3.70	. . .
	Ithaca, NEW YORK	. . .	4.85	5.20	4.50	. . .	6.30	5.70	. . .
	New Brunswick, NEW JERSEY	6.73	5.45	4.85	6.33	6.70	6.65	5.88	6.03
	Kingston, RHODE ISLAND	4.66	6.59	4.94	5.80	6.82	7.62	8.07	7.81
	Fairland, MARYLAND	5.58	5.83	5.81	5.67	6.63	5.92	6.68	6.44
	Centreville, MARYLAND	5.82	5.26	6.40	5.92	5.60	5.73	5.78	6.00

Table 1 continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Windsor	Mt. Carmel, CONNECTICUT	5.40	6.08	6.14	6.44	6.08	5.47	5.90	6.80
	University Park, PENNSYLVANIA	5.38	6.00	6.30	6.75	6.80	6.38	6.63	7.00
	Nassau County, NEW YORK	. . .	4.80	5.00	4.30	5.00	5.00	4.70	. . .
	Ithaca, NEW YORK	. . .	5.85	5.15	4.65	. . .	5.30	5.30	. . .
	New Brunswick, NEW JERSEY	4.18	3.48	3.63	4.88	5.15	5.50	5.45	5.48
	Kingston, RHODE ISLAND	3.79	6.11	4.40	6.26	7.34	7.52	7.80	6.95
	Fairland, MARYLAND	5.69	5.50	5.03	5.51	6.75	6.37	7.06	6.67
	Centreville, MARYLAND	5.46	5.20	6.20	5.88	5.34	5.35	5.75	5.68
	Burlington, VERMONT	. . .	7.33	6.08	6.30	7.38	7.92	7.63	. . .
	Blacksburg, VIRGINIA	6.84	6.04	7.00	6.27	6.20	6.88	7.03	6.93
	Newport News, VIRGINIA	6.40	5.06	6.40	4.65	6.86	6.46	5.35	5.80
WK-408	Mt. Carmel, CONNECTICUT	6.20	5.72	6.08	6.44	5.90	5.83	5.97	6.55
	University Park, PENNSYLVANIA	5.75	4.83	4.60	5.13	5.36	6.00	6.38	6.30
	Nassau County, NEW YORK	. . .	6.20	6.00	6.70	6.30	6.00	6.00	. . .
	New Brunswick, NEW JERSEY	3.13	2.33	2.50	2.95	3.50	4.00	3.10	3.05
	Kingston, RHODE ISLAND	2.83	3.80	3.14	5.00	6.52	6.68	6.94	6.10
	Fairland, MARYLAND	5.65	5.21	4.66	4.91	5.95	5.96	6.53	6.16
	Centreville, MARYLAND	4.94	4.68	5.72	5.08	4.88	4.75	4.98	4.75
	Burlington, VERMONT	. . .	6.63	4.28	5.02	6.46	7.00	7.65	. . .
	Blacksburg, VIRGINIA	6.94	6.31	6.56	7.04	6.63	7.43	7.07	7.03
	Newport News, VIRGINIA	7.48	6.68	7.26	5.65	6.74	5.86	5.18	6.23
WK-412	Mt. Carmel, CONNECTICUT	7.10	6.70	6.92	6.94	7.30	6.70	6.73	7.65
	University Park, PENNSYLVANIA	5.88	7.33	7.10	7.13	7.46	7.68	7.55	7.30
	Nassau County, NEW YORK	. . .	6.15	5.50	5.70	6.65	7.00	5.70	. . .
	Ithaca, NEW YORK	. . .	5.50	6.30	4.50	. . .	3.30	4.70	. . .
	New Brunswick, NEW JERSEY	6.20	6.58	6.50	6.53	6.80	7.15	7.00	6.38
	Kingston, RHODE ISLAND	4.26	6.54	6.78	7.52	7.36	7.64	7.48	7.26
	Fairland, MARYLAND	5.29	6.45	7.19	6.03	6.70	5.57	6.03	6.39
	Centreville, MARYLAND	4.46	5.14	6.28	5.88	5.60	5.25	5.78	5.60
	Burlington, VERMONT	. . .	7.90	6.25	6.30	6.92	7.56	8.35	. . .
	Blacksburg, VIRGINIA	6.69	6.70	6.89	7.14	6.87	5.75	6.99	7.00
	Newport News, VIRGINIA	7.74	7.28	7.66	6.00	7.16	6.26	5.60	6.20

Table 1 continued

Entry	Location	April	May	June	July	Aug	Sept	Oct	Nov
Zwartberg	Mt. Carmel, CONNECTICUT	4.20	5.32	5.52	5.96	5.65	5.43	6.10	6.40
	University Park, PENNSYLVANIA	5.25	6.97	7.10	7.13	7.28	7.00	7.50	6.70
	New Brunswick, NEW JERSEY	5.65	5.30	4.88	4.60	3.85	4.15	4.43	4.58
	Kingston, RHODE ISLAND	2.83	3.84	4.57	5.49	6.29	6.79	6.93	6.25
	Fairland, MARYLAND	4.88	6.00	6.08	5.22	5.93	5.54	5.72	5.26
	Burlington, VERMONT	. . .	6.13	4.90	5.26	6.36	5.80	6.50	. . .
	Blacksburg, VIRGINIA	6.50	6.80	6.31	7.23	5.10	6.03	6.31	6.85

Table ii. Mean monthly quality rank of Kentucky bluegrasses over 5 years at 11 locations, listed in order of decreasing annual quality at each location.

Mount Carmel, CONNECTICUT

Entry	April*	May	June	July	Aug	Sept	Oct	Nov
A-20	1.5	1.0H+**	1.0H+	1.0H	1.0H	1.0H+	1.0H+	1.0H
Belturf	4.5	2.5H	2.0H	2.0H	5.0H	3.0H	2.0H	2.0H
WK-412	4.5	2.5H	4.0H	7.0	2.0H	2.0H	3.0H	7.0H
Minnesota 6	1.5	7.0H	6.0H	5.0	3.0H	13.5H	13.0H	7.0H
Fylking	6.5	4.0H	10.5H	6.0	8.0H	11.0H	6.5H	19.5
Birka	12.0	10.0H	9.0H	9.0	4.0H	4.5H	9.5H	19.5
NJE P-35	11.0	12.0H	7.5H	15.0	9.0	21.5H	4.0H	31.0
A-34	13.5	9.0H	3.0H	15.0	6.5H	8.0H	5.0H	7.0H
Pennstar	6.5	8.0H	7.5H	8.0	11.0	15.0H	32.0H	23.5
Kenblue	3.0	6.0H	17.0	10.0	6.5H	6.5H	14.0H	11.0
Primo	18.0	17.0H	10.5H	4.0	14.0	4.5H	22.0H	19.5
Prato	9.0	11.0H	12.0H	18.5	18.5	6.5H	15.5H	10.0
S-10	21.5	5.0H	5.0H	3.0H	15.0	16.0H	20.0H	3.0H
PSU K-107	10.0	21.0H	21.5	11.0	11.0	25.0H	8.0H	19.5
Prenton	27.5	16.0H	16.0	12.0	22.0	20.0H	15.5H	19.5
Sydsport	37.0	28.0H	13.0H	18.5	18.5	11.0H	22.0H	4.0H
Merion	24.5	14.0H	28.5	15.0	28.0	9.0H	11.5H	14.5
Cougar	31.0	19.5H	21.5	15.0	16.0	25.0H	18.5H	14.5
Campus	24.5	30.0	14.0H	20.5	13.0	27.0H	11.5H	28.5
S. Dak. Certified	13.5	26.5H	24.0	15.0	11.0	11.0H	18.5H	28.5
Sodco	20.0	22.0H	28.5	20.5	24.0	13.5H	17.0H	14.5
NJE P-114	31.0	32.0	21.5	29.0L	21.0	23.0H	9.5H	7.0H
Palouse	15.5	24.5H	21.5	23.0	17.0	29.0	32.0H	26.0
S-21	18.0	13.0H	26.5	24.0	20.0	21.5H	35.0H	26.0
Geary	8.0	18.0H	18.0	22.0	29.0	19.0H	36.0	34.0L
Windsor	31.0	15.0H	25.0	27.0	26.0	34.0	32.0H	31.0
PSU K-162	18.0	19.5H	26.5	34.0L	23.0	17.0H	29.5H	36.0L
Georgetown	31.0	23.0H	19.0	30.5L	26.0	34.0	24.5H	7.0H
Arista	24.5	35.0	15.0H	25.0	33.0L	32.0	24.5H	12.0
A-408	15.5	29.0	30.0	27.0	31.0	25.0H	28.0H	37.0L
Park	31.0	24.5H	32.0	33.0L	30.0	38.0	39.0	34.0L
Delphi	36.0	33.5	33.0	30.5L	36.0L	30.0	26.5H	31.0
Newport	27.5	26.5H	31.0	27.0	39.0L	31.0	37.0	26.0
Delta	24.5	31.0	35.0	32.0L	26.0	34.0	29.5H	19.5
Vantage	21.5	37.0	36.0	36.0L	35.0L	18.0H	6.5H	38.0L
Aggget	34.0	33.5	34.0	35.0L	38.0L	28.0	34.0H	14.5
NJE P-56	38.0	39.0	38.5L	37.0L	32.0	39.0	26.5H	23.5
NJE P-5	35.0	38.0	37.0	39.0L	37.0L	37.0	38.0	34.0L
Hartberg	39.0	36.0	38.5L	38.0L	34.0L	36.0	22.0H	39.0L
Data included: 1969		X	X	X	X	X	X	X
1970		X	X	X	X	X	X	X
1971		X	X	X	X			
1972		X	X	X				
1973	X	X	X	X		X	X	

Duncan's Multiple Range separation not determined on 1 year's data.

Based on Duncan's Multiple Range, entries are separated into three groups: H = highest ranking entry plus all others not significantly lower; L = entries significantly lower than the lowest ranking entry in the highest group; + = entry significantly higher than all others

Table ii continued

Centreville, MARYLAND

Entry	April	May	June	July	Aug	Sept	Oct
Georgetown	1.0H	1.0H	2.0H	9.0H	3.0H	5.0H	2.0H
Belturf	9.0	3.0H	5.0H	2.0H	1.0H	1.0H	1.0H
Vantage	2.0H	4.0H	7.0H	4.0H	4.5H	2.0H	10.5H
K8-146	3.5H	7.5	7.0H	14.0H	2.0H	12.5H	5.0H
Aquila	3.5H	7.5	3.0H	17.5H	9.0H	14.5H	6.0H
K8-144	6.0H	2.0H	9.0H	13.0H	16.0H	8.5H	4.0H
Windsor	8.0H	5.0H	13.5H	6.0H	11.0H	11.0H	12.0H
Sydsport	25.0	10.5	7.0H	1.0H	6.0H	12.5H	13.0H
A-34	20.5	15.0	4.0	11.0H	11.0H	7.0H	7.0H
Birka	19.0	13.0	11.5H	3.0H	7.0H	3.0H	8.0H
Kenblue	5.0H	18.5	15.0H	22.0	14.5H	5.0H	3.0H
WK-412	31.0L	6.0	10.0H	6.0H	4.5H	14.5H	10.5H
Newport	11.0	16.0	27.5	8.0H	8.0H	16.0H	17.0
Cougar	26.5	14.0	1.0H	6.0H	22.5H	24.0	18.5
Sodco	26.5	26.5	11.5H	17.5H	18.5H	10.0H	9.0H
Minnesota 6	20.5	25.0	19.0H	17.5H	17.0H	8.5H	20.0
Prato	23.0	22.5	16.0H	17.5H	14.5H	21.0H	14.5H
Delta	10.0	10.5	34.0	12.0H	22.5H	20.0H	22.0
Merion	16.0	12.0	30.5	10.0H	11.0H	5.0H	28.5
NJE P-114	15.0	18.5	17.0H	20.5	21.0H	18.0H	18.5
Geary	7.0H	20.0	25.0	25.0	13.0H	19.0H	26.0
NJE P-5	17.5	31.5	20.0	27.5	24.0	17.0H	14.5H
S-21	12.0	9.0	30.5	15.0H	18.5H	27.0	31.0
S. Dak. Certified	14.0	17.0	33.0	23.0	20.0H	30.0	24.0
NJE P-56	24.0	22.5	27.5	34.0	30.5	22.5	16.0
WK-408	17.5	22.5	23.0	30.0	25.0	22.5	27.0
Nugget	34.0L	34.0L	13.5H	25.0	28.0	28.5	22.0
Palouse	13.0	30.0	18.0H	27.5	26.5	28.5	33.0
PSU K-107	29.0L	31.5	30.5	25.0	26.5	25.0	22.0
Primo	28.0	28.5	23.0	29.0	29.0	26.0	30.0
Park	22.0	26.5	23.0	32.0	30.5	31.0	32.0
Fylking	32.5L	22.5	26.0	31.0	33.5	32.0	28.5
Pennstar	32.5L	33.0L	30.5	33.0	32.0	33.0	25.0
Arista	30.0L	28.5	21.0	20.5	33.5	34.0L	34.0
Data included: 1969	X	X	X	X	X		X
1970	X	X	X	X	X	X	
1971	X	X	X	X	X	X	X
1972	X	X	X	X	X	X	X
1973	X	X	X	X	X	X	X

able ii continued

Fairland, MARYLAND

ntry	April	May	June	July	Aug	Sept	Oct	Nov
-20	1.0H+	1.0H	7.0H	1.0H	1.0H	1.0H	1.0H	1.0H
-34	5.5H	4.0	1.0H	2.0H	2.0H	6.0H	5.0H	3.0H
erion	2.0H	2.0H	3.0H	3.0H	8.0	3.0H	3.0H	4.0H
eorgetown	4.0H	5.0	9.5H	24.0	22.5L	10.0	4.0H	5.0H
irka	15.5H	7.0	9.5H	8.0	8.0	12.0	13.0H	8.0H
ylking	18.0H	6.0	4.0H	5.0	12.5	24.0	20.0H	9.0H
renton	3.0H	3.0H	13.0	21.5	17.0	26.0	20.0H	2.0H
K-412	21.0H	9.0	6.0H	5.0	8.0	19.0	27.0	14.5H
ewport	15.5H	23.0L	29.0L	9.0	5.0	4.0H	6.0H	7.0H
rimo	27.5	20.0	17.0	7.0	3.0	5.0H	9.0H	13.0H
ndsor	8.0H	27.0L	33.0L	23.0	6.0	2.0H	2.0H	6.0H
8-146	14.0H	13.0	15.0	11.0	22.5L	23.0	17.5H	20.0H
dsport	24.0	8.0	2.0H	5.0	10.0	33.0L	34.0	22.0H
ntage	11.0H	22.0L	27.0	13.5	11.0	8.0	7.5H	11.5H
U K-107	22.0	10.0	8.0H	16.0	28.0L	25.0	26.0	17.0H
lturf	26.0	19.0	26.0	10.0	4.0	14.0	11.5H	21.0H
-144	13.0H	15.0	22.5	15.0	19.5L	28.0	29.0	10.0H
uila	12.0H	17.0	21.0	13.5	24.5L	31.0	32.0	14.5H
dco	27.5	26.0L	18.0	20.0	14.0	13.0	20.0H	11.5H
E P-35	32.5	11.0	11.5H	21.5	15.0	35.0L	22.5H	28.0H
nstar	34.0	14.0	5.0H	18.0	21.0L	36.0L	36.0	33.0
21	10.0H	37.0L	40.0L	33.5L	19.5L	11.0	7.5H	16.0H
J K-128	35.0	12.0	11.5H	17.0	16.0	41.0L	40.0	28.0H
ouse	17.0H	36.0L	36.0L	32.0	26.0L	9.0	11.5H	19.0H
k	5.5H	32.0L	41.0L	30.0	34.0L	16.0	15.0H	25.0H
lphi	32.5	17.0	16.0	26.5	27.0L	37.0L	33.0	31.0
sta	37.5	25.0L	28.0	19.0	18.0L	29.0	29.0	26.0H
408	9.0H	35.0L	35.0L	40.0L	35.0L	7.0	10.0H	23.0H
K-162	7.0H	29.0L	31.0L	41.0L	29.0L	27.0	16.0H	34.0
0	19.0H	43.0L	43.0L	37.0L	36.5L	32.0	22.5H	28.0H
rtberg	31.0	17.0	22.5	33.5L	40.0L	20.0	35.0	43.0
ry	20.0H	38.0L	38.0L	38.0L	32.5L	15.0	17.5H	24.0H
P-114	36.0	24.0L	19.0	26.5	32.5L	38.0L	37.0	35.0
P-5	40.0	34.0L	20.0	12.0	12.5	34.0L	41.0	36.0
gar	41.0	30.0L	30.0L	31.0	38.5L	18.0	31.0	32.0
us	42.0	21.0	25.0	26.5	36.5L	40.0L	38.0	40.0
lue	23.0	41.0L	42.0L	43.0L	41.0L	17.0	14.0H	18.0H
esota 6	30.0	40.0L	37.0L	36.0L	31.0L	22.0	25.0	30.0
o	39.0	33.0L	32.0L	35.0	30.0L	30.0	29.0	37.0
P-56	37.5	31.0L	24.0	26.5	24.5L	39.0L	39.0	38.5
ak. Certified	25.0	39.0L	39.0L	42.0L	42.0L	21.0	24.0	38.5
et	43.0L	28.0L	14.0	29.0	38.5L	43.0L	42.0L	41.0
a	29.0	42.0L	34.0L	39.0L	43.0L	42.0L	43.0L	42.0
luded: 1969	X	X		X		X	X	X
1970	X	X	X	X	X	X	X	X
1971	X	X	X	X	X	X	X	
1972	X	X	X	X				

Table ii continued

New Brunswick, NEW JERSEY

Entry	April	May	June	July	Aug	Sept	Oct
Sodco	9.5H	5.5H	5.5H	2.0H	14.0H	11.0H	1.0H
Fylking	7.5H	2.0H	5.5H	4.0H	8.5H	5.5H	8.0H
NJE P-56	16.0H	5.5H	7.0H	1.0H	6.0H	2.5H	6.0H
PSU K-107	12.0H	4.0H	2.5H	6.0H	1.0H	8.5H	10.0H
Pennstar	15.0H	7.0H	4.0H	5.0H	11.0H	11.0H	12.0H
A-20	4.0H	8.0H	14.0H	8.0H	10.0H	15.5H	13.0H
WK-412	7.5H	11.0H	9.0H	12.0H	16.0H	11.0H	7.0H
PSU K-128	5.0H	10.0H	11.0H	13.5H	14.0H	13.5H	11.0H
Birka	13.0H	12.0H	10.0H	10.5H	4.0H	13.5H	9.0H
NJE P-114	2.0H	3.0H	2.5H	16.0	8.5H	5.5H	16.0
A-34	3.0H	9.0H	8.0H	17.0	20.0	15.5H	14.0
Aquila	19.0H	16.0	16.0	7.0H	4.0H	5.5H	4.0H
K8-144	17.0H	18.0	18.0	10.5H	2.0H	1.0H	2.0H
Belturf	21.0H	21.0L	15.0	3.0H	4.0H	2.5H	5.0H
K8-146	20.0H	20.0	17.0	9.0H	7.0H	5.5H	3.0H
Nugget	22.0	1.0H	1.0H+	19.0	12.0H	8.5H	19.5
Sydsport	11.0H	14.0H	12.0H	18.0	19.0	20.5	17.0
NJE P-5	14.0H	13.0H	13.0H	13.5H	14.0H	17.0H	18.0
Vantage	1.0H	15.0	20.0L	15.0H	17.0	18.0H	15.0
PSU K-162	6.0H	22.0L	21.0L	20.0	21.0	26.0	21.0
Georgetown	9.5H	19.0	22.0L	24.0L	22.0L	20.5	22.5L
Zwartberg	18.0H	17.0	19.0L	23.0L	30.0L	28.0L	26.0L
Windsor	23.0	24.0L	24.0L	22.0L	25.0L	24.0	19.5
Merion	24.0	23.0L	23.0L	21.0L	18.0	19.0H	22.5L
Cougar	34.0L	28.0L	27.0L	25.0L	26.0L	23.0	24.0L
Campus	31.5L	26.0L	25.0L	26.0L	23.5L	22.0	25.0L
Primo	31.5L	25.0L	26.0L	28.0L	29.0L	33.0L	28.0L
Arista	38.0L	29.0L	31.0L	30.5L	23.5L	25.0	27.0L
Geary	25.0	32.0L	32.0L	29.0L	31.5L	33.0L	30.5L
A-10	37.0L	30.5L	29.0L	27.0L	31.5L	33.0L	32.0L
Prato	35.5L	30.5L	28.0L	32.0L	27.0L	27.0L	30.5L
Park	26.0L	34.0L	39.0L	30.5L	34.0L	29.5L	33.0L
S-21	28.0L	36.0L	37.5L	34.5L	37.0L	35.5L	29.0L
Kenblue	27.0L	36.0L	35.5L	38.0L	36.0L	35.5L	34.0L
Palouse	29.0L	33.0L	35.5L	34.5L	38.0L	37.0L	35.0L
Minnesota 6	35.5L	38.0L	34.0L	36.0L	34.0L	29.5L	36.0L
WK-408	30.0L	36.0L	33.0L	33.0L	34.0L	31.0L	37.0L
Newport	33.0L	27.0L	30.0L	37.0L	28.0L	38.5L	40.0L
Delta	40.0L	39.0L	37.5L	39.0L	39.0L	40.0L	38.0L
S. Dak. Certified	39.0L	40.0L	40.0L	40.0L	40.0L	38.5L	39.0L
Data included: 1969							
1970	X	X	X	X	X	X	X
1971	X	X	X	X	X	X	X
1972	X	X	X	X			X
1973	X	X	X	X			X

Table ii continued

Ithaca, NEW YORK

Entry	May	June	July	Sept*	Oct*
NJE P-56	2.5H	1.0H	1.0H	2.5	1.5
NJE P-114	4.0H	4.0H	8.0H	2.5	5.0
A-20	1.0H	10.0H	24.0	8.5	3.5
A-10	17.5H	29.5	2.0H	1.0	1.5
Sodco	7.5H	17.0	9.5H	8.5	3.5
Prato	2.5H	8.5H	6.0H	27.5	30.5
Georgetown	5.0H	6.5H	17.0H	16.5	11.5
Pennstar	17.5H	3.0	4.0H	25.0	21.5
Fylking	19.0H	2.0H	14.5H	27.5	34.0
Arista	20.5H	20.5	3.0H	13.0	11.5
Vantage	7.5H	15.0	14.5H	20.0	21.5
Nugget	7.5H	5.0H	34.0	25.0	21.5
A-34	12.0H	8.5H	29.5	20.0	11.5
Delta	24.0H	17.0	6.0H	16.5	6.5
PSU K-107	26.0H	13.5	12.5H	20.0	21.5
Aquila	10.5H	13.5	26.5	25.0	30.5
Cougar	10.5H	11.5H	20.5	32.5	21.5
Belturf	27.0	20.5	9.5H	16.5	30.5
WK-412	15.0H	6.5H	22.5	32.5	30.5
Sydsport	7.5H	20.5	32.0	29.5	11.5
Newport	24.0H	25.0	22.5	5.0	6.5
Minnesota 6	29.0	29.5	6.0H	4.0	11.5
K8-144	20.5H	20.5	26.5	13.0	11.5
Windsor	24.0H	26.0	20.5	16.5	11.5
Birka	15.0H	11.5H	31.0	32.5	30.5
Merion	15.0H	23.5	29.5	29.5	21.5
Park	31.0	27.0	17.0H	8.5	11.5
Palouse	30.0	33.0L	11.0H	13.0	21.5
Kenblue	28.0	33.0L	12.5H	8.5	21.5
Primo	22.0H	23.5	26.5	22.5	21.5
Geary	32.5	29.5	17.0H	8.5	21.5
K8-146	13.0H	17.0	33.0	32.5	30.5
S-21	34.0	29.5	19.0	22.5	21.5
S. Dak. Certified	32.5	33.0L	26.5	8.5	21.5
Data included: 1969					
1970					
1971	X	X	X		
1972	X	X	X	X	X
1973					

Table ii continued

Nassau County, NEW YORK

Entry	May	June	July*	Aug	Sept*
Nugget	1.0H	1.0H	1.0	1.0H	3.0
WK-408	2.0H	4.0	2.0	5.5H	9.5
Birka	4.5H	2.0H	4.0	3.0H	9.5
WK-412	4.5H	8.5	11.5	2.0H	3.0
Merion	4.5H	7.0	7.0	4.0H	3.0
Sodco	11.0H	3.0H	16.5	8.0H	20.5
A-34	14.0	8.5	16.5	5.5H	1.0
PSU K-107	4.5H	5.0	16.5	14.5	9.5
Fylking	12.5H	11.0	11.5	8.0H	9.5
Sydsport	9.0H	15.0L	7.0	8.0H	9.5
NJE P-56	9.0H	6.0	4.0	17.5	20.5
NJE P-114	9.0H	11.0	11.5	11.5H	15.0
K8-144	12.5H	11.0	16.5	10.0H	20.5
A-20	7.0H	15.0L	11.5	14.5	20.5
Aquila	21.0	21.0L	11.5	11.5H	9.5
K8-146	16.5	13.0L	7.0	22.5	29.0
Belturf	19.0	21.0L	11.5	17.5	9.5
Pennstar	20.0	19.0L	19.5	14.5	9.5
Windsor	18.0	15.0L	23.0	22.5	20.5
Cougar	26.5L	17.0L	21.5	22.5	9.5
Georgetown	15.0	18.0L	25.0	25.0	20.5
Prato	28.0L	25.5L	19.5	14.5	9.5
Arista	29.0L	21.0L	21.5	20.0	20.5
Primo	24.0	27.0L	4.0	22.5	20.5
Newport	25.0	23.5L	28.0	19.0	20.5
Vantage	16.5	23.5L	25.0	26.0L	20.5
Kenblue	22.5	25.5L	28.0	27.0L	29.0
Palouse	22.5	28.0L	28.0	28.0L	29.0
A-10	26.5L	29.0L	25.0	30.0L	29.0
Minnesota 6	33.5L	30.0L	31.0	29.0L	29.0
S. Dak. Certified	33.5L	34.0L	34.0	34.5L	29.0
S-21	30.0L	32.0L	31.0	31.5L	34.0
Geary	31.0L	32.0L	31.0	33.0L	29.0
Park	35.0L	32.0L	34.0	31.5L	34.0
Delta	32.0L	35.0L	34.0	34.5L	34.0
Data included: 1969					
1970					
1971	X	X	X	X	X
1972	X	X		X	
1973					

)le ii continued

University Park, PENNSYLVANIA

:ry	April	May	June	July	Aug	Sept	Oct	Nov*
ınstar	20.0H	8.0H	3.0H	2.5H	3.5H	4.5H	3.5H	3.0
king	16.5H	11.0H	3.0H	2.5H	6.0H	3.0H	2.0H	7.5
·ka	16.5H	14.5H	12.0H	9.0H	1.0H	10.5H	5.5H	7.5
K-107	12.5H	14.5H	8.5H	9.0H	5.0H	7.5H	11.0H	12.0
4	16.5H	9.0H	5.5H	5.0H	3.5H	1.0H	18.0H	7.5
412	7.5H	14.5H	12.0H	17.0H	7.0H	7.5H	8.0H	14.5
P-56	30.0	2.0H	12.0H	5.0H	2.0H	2.0H	1.0H	21.0
K-128	30.0	4.0H	5.5H	13.0H	8.0H	6.0H	7.0H	21.0
ion	16.5H	6.0H	3.0H	5.0H	17.0H	25.5	3.5H	14.5
rgetown	3.5H	10.0H	8.5H	20.0	19.0H	18.0H	14.5H	7.5
get	40.0L	1.0H	1.0H	1.0H	15.0H	27.5	23.0H	1.5
rtberg	26.5H	21.0H	12.0H	17.0H	9.0H	15.5H	11.0H	27.0
sport	23.0H	14.5H	7.0H	13.0H	18.0H	15.5H	14.5H	1.5
co	5.0H	22.5	18.5	17.0H	10.0H	15.5H	16.5H	21.0
P-114	23.0H	6.0H	20.0	7.0H	11.0H	10.5H	11.0H	21.0
nton	33.5	20.0H	15.5H	9.0H	12.0H	4.5H	11.0H	7.5
lphi	1.0H	18.5H	18.5	13.0H	13.5H	10.5H	23.0H	27.0
P-35	7.5	3.0H	12.0H	13.0H	16.0H	13.0H	19.5H	37.0
P-5	3.5H	14.5H	23.0	13.0H	13.5H	10.5H	5.5H	34.5
tage	23.0H	14.5H	15.5H	19.0H	21.0H	19.0H	25.5H	34.5
port	10.5H	22.5	23.0	25.5	24.0H	21.0H	16.5H	14.5
)	2.0H	6.0H	17.0H	24.0	27.0H	23.5	31.0	7.5
no	12.5H	25.0	23.0	25.5	24.0H	15.5H	11.0H	7.5
sta	33.5	24.0	21.0	22.5	22.0H	21.0H	19.5H	7.5
dsor	23.0H	27.0	25.0	21.0	20.0H	25.5	25.5H	21.0
ous	23.0H	26.0	27.0	22.5	24.0H	21.0H	21.0H	21.0
gar	30.0	34.0L	28.0	30.5L	26.0H	23.5	27.5H	21.0
to	16.5H	29.0	29.5L	28.0L	28.0	29.5	27.5H	14.5
turf	16.5H	18.5H	26.0	27.0	30.5	33.5	33.0	39.0
<	30.0	28.0	29.5L	32.5L	30.5	33.5	29.5	21.0
K-162	39.0	30.0L	31.5L	29.0L	29.0	27.5	23.0H	30.0
408	10.5H	32.0L	36.0L	30.5L	32.0	29.5	29.5	30.0
ouse	7.5H	40.0L	33.0L	32.5L	33.0	31.0	32.0	32.0
y	30.0	31.0L	31.5L	34.0L	34.5	32.0	35.0	34.5
	7.5H	34.0L	34.5L	35.0L	34.5	35.5L	36.0	27.0
lue	26.5H	36.0L	34.5L	39.5L	38.0L	37.0L	34.0	30.0
esota 6	35.5	34.0L	39.0L	37.0L	36.0L	35.5L	37.0	34.5
)	37.5	37.0L	37.0L	36.0L	37.0L	38.0L	40.0L	21.0
:a	37.5	38.5L	38.0L	38.0L	40.0L	40.0L	39.0L	40.0
)ak. Certified	35.5	38.5L	40.0L	39.5L	39.0L	39.0L	38.0L	38.0
:luded: 1969			X		X		X	
1970	X	X	X	X	X	X	X	X
1971	X		X	X	X	X		
1972	X	X	X	X	X	X	X	
1973	X	X	X	X	X	X	X	

Table ii continued

Kingston, RHODE ISLAND

Entry	April	May	June	July	Aug	Sept	Oct
NJE P-56	10.0	6.0H	2.0H	2.0H	5.0H	4.5H	3.0H
Trenton	1.0H	3.0H	7.0	15.0H	11.0H	2.0H	4.0H
NJE P-114	3.0H	2.0H	5.0	4.0H	9.0H	15.0H	7.5H
A-20	6.0H	1.0H	3.0H	3.0H	6.0H	1.0H	10.0H
A-34	9.0	4.0H	4.0	7.0H	8.0H	6.5H	1.0H
NJE P-35	5.0H	8.0	14.0	16.0	10.0H	6.5H	2.0H
Sydsport	12.0	9.5	10.0	8.5H	1.0H	20.0H	5.0H
Adelphi	2.0H	7.0H	6.0	18.0	23.5H	17.0H	16.0
Sodco	14.0L	15.0	18.0	5.0H	4.0H	4.5H	11.5H
Merion	13.0	5.0H	16.0	10.5H	3.0H	8.0H	24.0
Birka	16.0L	13.0	11.0	14.0H	12.0H	9.0H	18.5
WK-412	11.0	11.0	8.0	10.5H	19.0H	13.0H	23.0
Georgetown	4.0H	12.0	15.0	17.0	26.0	23.0H	9.0H
Nugget	40.0L	14.0	1.0H	1.0H	15.0H	28.5H	29.0L
PSU K-128	22.0L	21.0	17.0	13.0H	7.0H	15.0H	22.0
PSU K-107	23.0L	18.0	12.0	12.0H	16.0H	26.0H	25.0
Fylking	24.0L	19.0	13.0	8.5H	13.5H	27.0H	28.0
Pennstar	28.0L	20.0	9.0	6.0H	17.0H	24.0H	30.0L
NJE P-5	7.5	16.0	19.0	21.5	29.0	28.5H	17.0
Aquila	17.0L	24.0L	22.0L	20.0	13.5H	19.0H	11.5H
Belturf	21.0L	32.0L	20.0L	21.5	2.0H	3.0H	6.0H
Vantage	7.5	9.5	23.5L	31.0L	28.0	15.0H	7.5H
K8-144	15.0L	22.0L	21.0L	23.0	18.0H	11.0H	13.0H
K8-146	18.0L	25.0L	25.0L	19.0	23.5H	12.0H	14.0H
Windsor	19.0L	17.0	28.0L	26.0	20.0H	21.0H	15.0
Campus	36.5L	34.5L	26.0L	25.0	21.0H	10.0H	18.5
Primo	39.0L	33.0L	23.5L	24.0	22.0H	18.0H	20.0
Cougar	36.5L	40.0L	30.0L	28.5L	25.0H	22.0H	21.0
PSU K-162	20.0L	23.0L	29.0L	27.0	31.0	33.0	35.0L
Newport	25.0L	30.0L	32.0L	30.0L	32.0	32.0	27.0
Arista	41.0L	41.0L	33.0L	28.5L	27.0	25.0H	26.0
Zwartberg	34.5L	36.5L	27.0L	32.0L	34.0	34.0	34.0L
Prato	42.0L	42.0L	31.0L	33.0L	30.0	30.0	31.0L
WK-408	34.5L	38.0L	39.0L	34.0L	33.0	36.0	33.0L
Delta	33.0L	26.0L	34.0L	36.0L	42.0L	42.0L	36.0L
Kenblue	27.0L	39.0L	38.0L	37.0L	35.0L	35.0	32.0L
Park	30.0L	28.0L	35.0L	39.0L	38.0L	40.0L	37.0L
S-21	31.0L	29.0L	37.0L	38.0L	39.0L	38.0L	42.0L
Geary	26.0L	27.0L	42.0L	40.0L	41.0L	41.0L	40.0L
Minnesota 6	29.0L	34.5L	40.0L	35.0L	37.0L	39.0L	41.0L
A-10	38.0L	36.5L	36.0L	42.0L	36.0L	31.0	39.0L
Palouse	32.0L	31.0L	41.0L	41.0L	40.0L	37.0L	38.0L
S. Dak. Certified			43.0L	43.0L	43.0L	43.0L	43.0L
Data included: 1969			X	X	X	X	X
1970	X	X	X	X	X	X	X
1971	X	X	X	X	X	X	X
1972	X	X	X	X	X	X	X
1973	X	X	X	X	X	X	X

ıble ii continued

Burlington, VERMONT

ıtry	May	June	July	Aug	Sept	Oct
·20	1.0H	2.0H	3.0H	2.0H	1.0H	1.0H
·rion	2.0H	7.0H	2.0H	1.0H	2.0H	2.0H
ıgget	3.0H	1.0H	1.0H	5.0H	11.0H	16.0H
·enton	9.0H	3.5H	5.0H	7.5H	5.0H	3.0H
IE P-35	9.0H	10.5H	9.0H	4.0H	3.0H	7.5H
34	4.0H	13.0	7.0H	6.0H	4.0H	17.0H
E P-114	9.0H	8.5H	6.0H	10.0H	6.5H	5.0H
lelphi	5.0H	8.5H	8.0H	9.0H	6.5H	9.0H
lturf	23.0	14.5	4.0H	3.0H	8.0H	5.0H
dco	19.0H	16.0	11.5H	7.5H	10.0H	10.0H
E P-56	6.0H	5.5H	17.0H	16.0H	14.0H	11.0H
orgetown	20.5H	3.5H	10.0H	14.5H	12.0H	20.0H
nnstar	13.0H	10.5H	11.5H	14.5H	18.0H	13.5H
dsport	14.5H	5.5H	14.0H	12.0H	13.0H	15.0H
E P-5	7.0H	12.0	18.0	20.0H	17.0H	12.0H
-412	12.0H	19.0	15.5H	21.0H	16.0H	5.0H
lking	22.0H	17.0	13.0H	19.0H	15.0H	13.5H
ndsor	18.0H	20.0	15.5H	13.0H	9.0H	23.0
rka	11.0H	23.0	22.0	18.0H	19.0H	7.5H
U K-128	16.0H	14.5	19.0	17.0H	21.0	19.0H
U K-107	20.5H	18.0	20.0	23.5	26.0	27.5
U K-162	14.5H	22.0	21.0	23.5	24.0	27.5
uila	25.0	26.0	26.0	25.0	23.0	18.0H
nnesota 6	27.0	28.0L	32.0	11.0H	22.0	29.0
ntage	17.0H	21.0	23.0	32.5	32.5	37.0
-144	24.0	24.5	28.5	34.0	30.0	21.5H
ato	39.0	27.0L	24.0	22.0	28.0	31.0
21	29.0	31.0L	27.0	27.0	20.0	24.0
ugar	37.0	24.5	25.0	28.0	27.0	26.0
-408	26.0	39.5L	34.5	26.0	25.0	21.5H
ary	28.0	34.0L	31.0	31.0	31.0	25.0
nblue	35.5	32.0L	28.5	32.5	29.0	32.5
-146	35.5	30.0L	34.5	29.5	32.5	35.0
imo	30.0	35.0L	39.0L	37.5	35.0	30.0
artberg	32.0	29.0L	30.0	29.5	41.0L	38.5
louse	38.0	39.5L	40.0L	37.5	34.0	32.5
wport	31.0	33.0L	36.5	39.0	40.0L	34.0
lta	33.5	37.0L	38.0L	41.0	37.5L	36.0
rk	33.5	38.0L	41.0L	40.0	36.0	38.5
Dak. Certified	40.0L	43.0L	43.0L	36.0	37.5L	40.5
mpus	42.0L	36.0L	33.0	42.0L	42.0L	40.5
10	41.0L	42.0L	42.0L	35.0	39.0L	43.0L
ista	43.0L	41.0L	36.5L	43.0L	43.0L	42.0L
ta						
ıcluded: 1969			X	X	X	X
1970	X	X	X	X	X	X
1971	X	X	X	X	X	X
1972	X	X	X	X	X	
1973	X	X	X	X	X	X

Table ii continued

Blacksburg, VIRGINIA

Entry	April	May	June	July	Aug	Sept	Oct
Adelphi	2.0H	4.0H	2.0H	9.0H	33.0	1.0H	5.0H
NJE P-56	5.5H	6.0H	1.0H	1.0H	13.0H	2.0H	9.5H
NJE P-114	3.0H	1.0H	6.0H	3.0H	27.5	3.0H	6.0H
NJE P-5	13.0H	7.0H	3.0H	20.0	4.0H	4.0H	4.0H
A-20	1.0H	11.0H	25.0	18.0H	14.0H	29.0	2.0H
Sodco	8.5H	10.0H	9.0H	13.0H	8.0H	11.0H	1.0H
Fylking	7.0H	18.0H	14.0H	2.0H	3.0H	13.5H	17.5
Belturf	23.0H	15.0H	8.0H	27.0	5.5H	5.0H	9.5H
Georgetown	8.5H	19.0H	15.5H	29.0	1.5H	7.5H	19.5
Pennstar	11.0H	2.0H	11.5H	10.0H	10.0H	20.5	39.0
NJE P-35	5.5H	17.0H	7.0H	17.0H	17.5	7.5H	30.5
Vantage	4.0H	14.0H	4.0H	22.5	27.5	17.0H	24.5
Birka	22.0H	12.0H	5.0H	14.0H	22.5	24.5	8.0H
A-34	11.0H	9.0H	11.5H	24.0	1.5H	26.0	28.0
A-10	16.0H	30.0	19.0	11.5H	34.0	9.0H	3.0H
PSU K-107	19.5H	8.0H	20.0	11.5H	16.0	18.0	19.5
WK-408	11.0H	24.0	24.0	25.5	11.5H	10.0H	11.0H
K8-144	24.0H	20.0H	18.0	8.0H	5.5H	20.5	30.5
Aquila	34.0	23.0	34.0	4.0H	22.5	12.0H	12.5H
WK-412	17.5H	22.0H	13.0H	22.5	8.0H	30.5	14.0H
Sydsport	15.0H	5.0H	26.0	28.0	20.0	34.5	34.0
Merion	19.5H	16.0H	17.0H	37.0L	24.5	6.0H	15.0H
K8-146	31.5	13.0H	27.0	5.5H	29.0	20.5	36.5
Primo	26.0	25.5	23.0	21.0	20.0	27.0	7.0H
Windsor	14.0H	28.0	10.0H	36.0L	20.0	24.5	12.5H
Newport	31.5	32.0	28.0	25.5	11.5H	15.0H	22.0
Nugget	38.0L	3.0H	29.0	32.0	32.0	32.5	35.0
Arista	40.0L	31.0	15.5H	15.5H	8.0H	13.5H	26.0
Zwartberg	25.0H	21.0H	31.0	19.0	38.0L	40.0L	38.0
Cougar	36.0	25.5	30.0	15.5H	35.0L	30.5	27.0
Delta	21.0H	27.0	21.0	34.0L	39.0L	39.0	24.5
Campus	39.0L	29.0	22.0	7.0H	24.5	16.0H	30.5
S-21	30.0	36.0L	33.0	33.0	15.0	28.0	16.0H
Kenblue	29.0	38.0L	38.0	30.0	17.5	23.0	23.0
Prato	37.0	33.0	35.5	5.5H	26.0	37.0	21.0
Palouse	35.0	40.0L	37.0	31.0	30.5	20.5	36.5
Minnesota 6	28.0	34.0	32.0	35.0L	37.0L	38.0	30.5
Geary	27.0	39.0L	35.5	39.0L	30.5	34.5	33.0
S. Dak. Certified	17.5H	37.0L	39.0	38.0L	40.0L	36.0	40.0L
Park	33.0	35.0L	40.0L	40.0L	36.0L	32.5	17.5
Data included: 1969			X			X	
1970	X	X	X	X	X	X	X
1971	X	X	X	X	X	X	X
1972	X	X	X	X		X	X
1973	X	X	X	X			X

le ii continued

Newport News, VIRGINIA

ry	April	May	June	July	Aug	Sept	Oct	Nov
sport	2.0H	1.0H	1.0H	1.0H	1.0H	2.0H	1.5H	1.0H
112	3.0H	2.0H	4.5H	3.0H	5.0H	6.5H	5.5H	9.0
	1.0H	3.0H	6.0H	11.5H	7.5	13.5H	15.0H	10.5
ta	11.0H	4.0H	2.0H	8.5H	3.0H	8.5H	11.5H	15.5
tage	7.0H	12.5	14.0	5.0H	4.0H	1.0H	1.5H	3.5H
to	11.0H	12.5	7.5H	6.0H	2.0H	5.0H	5.5H	2.0H
on	14.0H	14.0	4.5H	3.0H	6.0	8.5H	11.5H	15.5
08	5.0H	8.0H	9.5H	7.0H	9.0	13.5H	16.5H	6.5
ing	8.0H	6.0H	3.0H	8.5H	24.0	15.0H	8.0H	15.5
P-5	9.0H	6.0H	9.5H	18.0	10.5	16.0H	29.0	6.5
getown	4.0H	10.0H	7.5H	16.0	19.5	22.5	9.5H	6.5
44	15.0H	11.0H	12.0H	14.0H	24.0	19.5	16.5H	10.5
ort	18.0	16.0	18.0	30.0	15.5	11.5H	19.0H	12.0
46	11.0H	21.0	13.0H	10.0H	21.0	27.0	24.5	3.5H
star	6.0H	6.0H	11.0H	24.0	29.5L	31.0L	20.0H	21.0
sor	19.0	25.0L	20.5	26.5	7.5	3.0H	13.5H	18.5
la	16.0	15.0	17.0	14.0H	27.5L	25.0	24.5	15.5
y	26.5L	26.0L	24.5	24.0	12.0	4.0H	9.5H	6.5
urf	21.0	24.0L	28.0L	11.5H	13.0	19.5	4.0H	18.5
ar	20.0	18.0	15.0	24.0	26.0L	24.0	31.0	13.0
-56	17.0	17.0	22.0	18.0	24.0	28.0	28.0	21.0
	24.0	19.5	16.0	3.0H	19.5	21.0	30.0	26.0
	13.0H	9.0H	19.0	18.0	32.5L	32.0L	33.0L	31.5L
	25.0	29.0L	29.0L	28.0	14.0	10.0H	22.0H	23.5
	22.0	22.0	24.5	30.0	29.5L	30.0	27.0	23.5
sota 6	31.0L	31.0L	26.5L	21.0	18.0	11.5H	7.0H	27.5
	26.5L	23.0	23.0	21.0	27.5L	29.0	18.0H	27.5
	30.0L	27.0L	26.5L	26.5	17.0	22.5	22.0H	21.0
se	29.0L	28.0L	30.0L	32.0	22.0	18.0	22.0H	31.5L
	28.0L	30.0L	32.0L	14.0H	10.5	26.0	26.0	29.0
ue	32.0L	32.0L	31.0L	21.0	15.5	6.5H	3.0H	30.0L
a	23.0	19.5	20.5	33.0	32.5L	33.0L	32.0L	33.0L
k. Certified	33.0L	33.0L	30.0L	30.0	31.0L	17.0	13.5H	25.0

uded:									
	1969								
	1970								
	1971	X	X	X		X	X		
	1972	X	X	X		X	X	X	X
	1973	X	X	X	X	X	X	X	X

Table iii. Thatch determinations based on dry weight (in grams) of organic matter.

Entry	MARYLAND (Fairland)	RHODE ISLAND (Kingston)	RHODE ISLAND (Kingston)	VIRGINIA (Blacksburg)	VIRGIN (Newport
Newport	4.33 BCD*	2.57 EF	4.30 ABC	3.95 A-G	4.18 B
Vantage	4.75 BCD	3.10 C-F	4.00 ABC	3.67 A-H	5.40 A
Windsor	4.17 BCD	3.57 B-F	4.40 ABC	3.45 C-H	4.18 B
S. Dak. Certified	4.50 BCD	. . .	. . .	2.73 H	4.10 C
Arista	4.25 BCD	3.17 C-F	4.63 ABC	3.81 A-G	3.78 E
Sydsport	4.68 BCD	3.63 B-F	3.50 BC	4.58 AB	5.03 A
Nugget	4.17 BCD	4.03 A-D	4.90 AB	4.68 A	. . .
Palouse	4.04 BCD	2.40 F	4.03 ABC	3.10 FGH	4.13 C
A-34	4.67 BCD	3.80 A-F	4.43 ABC	3.56 B-H	4.70 A
Pennstar	4.83 BCD	3.97 A-E	4.43 ABC	3.74 A-H	5.03 A
Cougar	3.71 CD	2.67 DEF	4.60 ABC	2.72 H	4.05 D
Park	3.83 CD	2.97 C-F	4.16 ABC	3.00 GH	4.20 B
Geary	4.17 BCD	3.33 B-F	. . .	3.21 E-H	5.33 A
S-21	3.83 CD	3.07 C-F	3.63 BC	3.28 D-H	4.58 A-
Fylking	4.63 BCD	3.40 B-F	4.50 ABC	3.85 A-G	4.75 A-
Merion	3.92 CD	4.10 ABC	4.57 ABC	3.40 D-H	4.38 A-
Delta	3.75 CD	2.83 C-F	3.23 C	3.30 D-H	4.70 A-
Prato	4.50 BCD	2.97 C-F	4.43 ABC	4.10 A-F	4.53 A-
WK-408	3.92 CD	. . .	4.10 ABC	4.27 A-D	4.93 A-
Birka	4.67 BCD	3.17 C-F	4.47 ABC	3.99 A-G	5.35 A
WK-412	4.54 BCD	4.00 A-D	3.90 ABC	4.49 ABC	5.00 A-
Minnesota 6	4.17 BCD	3.40 B-F	3.93 ABC	3.61 B-H	4.15 B-
Sodco	4.79 BCD	3.67 B-F	4.57 ABC	3.65 A-H	5.25 A-
Primo	3.63 D	3.13 C-F	3.77 ABC	3.16 FGH	4.43 A-
Kenblue	4.25 BCD	3.07 C-F	4.10 ABC	3.28 D-H	3.65 F
Belturf	4.42 BCD	3.20 C-F	4.50 ABC	3.89 A-G	4.73 A-
NJE P-56	4.29 BCD	4.10 ABC	4.50 ABC	4.22 A-E	4.43 A-
NJE P-114	4.29 BCD	3.83 A-E	4.40 ABC	4.30 A-D	. . .
NJE P-5	4.21 BCD	2.93 C-F	4.80 AB	4.22 A-E	4.95 A-
NJE P-35	4.79 BCD	3.67 B-F	3.87 ABC	3.56 B-H	. . .
Adelphi	3.92 CD	3.93 A-E	4.13 ABC	3.30 D-H	. . .
Trenton	4.42 BCD	2.87 C-F	4.07 ABC	. .	. . .
Georgetown	4.25 BCD	4.07 A-D	4.30 ABC	3.99 A-G	4.75 A-
PSU K-107	4.71 BCD	5.10 A	5.03 AB	3.93 A-G	. . .
Zwartberg	4.38 BCD	3.47 B-F	4.83 AB	3.65 A-H	. . .
Campus	4.00 BCD	3.60 B-F	4.20 ABC	3.10 FGH	. . .
PSU K-162	4.08 BCD	. . .	3.63 BC	. . .	. . .
PSU K-128	4.71 BCD	. . .	4.80 AB	. . .	. . .
K8-146	4.67 BCD	3.33 B-F	4.93 AB	3.29 D-H	4.45 A-
Aquila	4.83 BCD	3.70 B-F	4.70 ABC	4.27 A-D	4.93 A-
K8-144	5.08 BC	3.53 B-F	3.97 ABC	4.24 A-E	4.90 A-
A-10	8.46 A	3.13 C-F	5.30 A	4.07 A-F	4.60 A-
A-20	5.40 B	4.70 AB	4.90 AB	3.79 A-G	4.80 A-
Average	4.44	3.47	4.33	3.71	4.62
Fertility (kg N/100 m^2)	1.47	1.96	1.96	1.47 & 2.44	1.72
Mowing ht. (cm)	3.8	1.9	3.8	3.8	5.0 & 2

** Means with like letters do not differ significantly from each other.*

ble iv. Thatch determinations based on compressed height (cm).

try	MARYLAND (Fairland)	RHODE ISLAND (Kingston)	RHODE ISLAND (Kingston)	VIRGINIA (Blacksburg)	VIRGINIA (Newport News)
wport	1.77 C-H*	1.30 EFG	1.70 D-G	1.73 C-I	1.70 G-K
ntage	1.87 B-E	1.43 C-G	1.67 D-G	1.62 D-J	2.27 AB
ndsor	1.73 C-F	1.40 C-G	2.00 A-D	1.67 C-I	1.97 B-F
Dak. Certified	1.40 J	. . .	. .	1.52 F-J	1.73 F-K
ista	1.67 D-J	1.23 FG	1.77 C-G	1.67 C-I	1.62 JKL
dsport	1.60 D-J	1.60 B-F	1.90 A-F	1.78 B-I	2.29 A
gget	1.57 E-J	1.73 A-D	2.23 A	2.27 A	. .
louse	1.63 D-J	1.33 D-G	1.63 EFG	1.43 IJ	1.54 KL
34	1.77 C-H	1.50 C-G	1.67 D-G	1.60 E-J	1.96 B-I
nstar	1.83 B-F	1.60 B-F	1.90 A-F	1.77 B-I	2.03 A-F
gar	1.43 IJ	1.23 FG	1.87 B-F	1.23 J	1.79 E-K
k	1.50 C-J	1.30 EFG	1.63 EFG	1.47 HIJ	1.68 G-K
ry	1.70 C-J	1.37 C-G	. .	1.48 G-J	1.66 H-L
1	1.53 F-J	1.23 FG	1.50 G	1.52 F-J	1.91 C-J
king	1.87 B-E	1.37 C-G	1.87 B-F	1.90 A-F	1.95 B-I
ion	1.57 E-J	1.60 B-F	2.00 A-D	1.60 E-J	1.83 C-K
ta	1.47 HIJ	1.37 C-G	1.63 EFG	1.63 D-J	1.76 E-K
to	1.50 C-J	1.13 G	1.63 EFG	1.91 A-F	1.84 C-K
408	1.47 HIJ	. . .	1.77 C-G	1.95 A-E	2.00 A-G
ka	1.83 B-F	1.47 C-G	1.83 B-G	1.95 A-E	2.14 A-D
412	1.73 C-I	1.77 ABC	1.77 C-G	2.15 AB	2.09 A-E
nesota 6	1.57 E-J	1.43 C-G	1.60 FG	1.68 C-I	1.64 I-L
co	1.83 B-F	1.70 A-E	1.97 A-E	1.82 B-I	2.16 ABC
mo	1.43 IJ	1.43 C-G	1.87 B-F	1.87 A-H	1.95 B-I
blue	1.60 D-J	1.50 C-G	1.87 B-F	1.63 D-J	1.81 D-K
turf	1.80 B-G	1.60 B-F	1.83 B-G	1.77 B-I	1.98 A-H
P-56	1.70 C-J	1.93 AB	2.07 ABC	2.23 A	1.80 D-K
P-114	1.63 D-J	1.53 C-G	1.97 A-E	2.02 A-D	. .
P-5	1.67 D-J	1.37 C-G	1.87 B-F	1.93 A-E	2.06 A-E
P-35	1.90 BCD	1.50 C-G	1.87 B-F	1.87 A-H	. .
lphi	1.60 D-J	1.43 C-G	1.70 D-G	1.80 B-I	. .
nton	1.73 C-I	1.57 B-F	1.80 C-G	. .	. .
rgetown	1.70 C-J	1.50 C-G	1.90 A-F	1.78 B-I	1.94 C-J
K-107	1.83 B-F	1.67 A-E	1.83 B-G	1.88 A-G	. .
rtberg	1.77 C-H	1.20 FG	1.87 B-F	1.65 C-I	. .
ous	1.43 IJ	1.37 C-G	1.83 B-G	1.58 E-J	. .
K-162	1.63 D-J	. . .	1.67 D-G	. .	. .
K-128	1.80 B-G	. . .	1.70 D-G	. .	. .
146	1.80 B-G	1.30 EFG	1.97 A-E	1.68 C-I	2.11 A-E
ila	2.00 BC	1.67 A-E	2.10 ABC	1.90 A-F	2.16 ABC
144	2.10 B	1.53 C-G	2.17 AB	2.05 ABC	2.13 A-D
)	2.53 A	1.37 C-G	1.83 B-G	1.58 E-J	1.64 I-L
)	2.00 BC	2.03 A	2.17 AB	1.57 E-J	1.37 L
Average	1.71	1.48	1.84	1.75	1.89
tility g N/100 m^2)	1.47	1.96	1.96	1.47 & 2.44	1.72
ing ht (cm)	3.8	1.9	3.8	3.8	5.0 & 2.5

eans with like letters do not differ significantly from each other.

Table v. Thatch determination based on uncompressed height (cm).

Entry	MARYLAND (Fairland)	RHODE ISLAND (Kingston)	RHODE ISLAND (Kingston)	VIRGINIA (Newport News)
Newport	2.53 C-G*	1.60 IJK	2.67 F-I	1.99 H-K
Vantage	2.67 BCD	2.27 B-G	2.50 GHI	2.70 AB
Windsor	2.53 C-G	2.00 D-K	2.87 A-I	2.34 A-I
S. Dak. Certified	2.07 IJK	. . .	. .	2.07 F-J
Arista	2.20 E-K	1.57 JK	2.93 A-H	2.12 E-J
Sydsport	2.20 E-K	2.30 B-E	3.10 A-F	2.73 A
Nugget	2.17 F-K	2.60 ABC	3.40 A	. . .
Palouse	2.17 F-K	1.60 IJK	2.40 HI	1.82 JK
A-34	2.53 C-G	2.33 B-E	2.87 A-I	2.30 B-I
Pennstar	2.43 C-I	2.23 B-H	2.80 C-I	2.44 A-G
Cougar	1.97 K	1.67 H-K	2.83 B-I	2.25 C-I
Park	2.17 F-K	1.77 E-K	2.73 E-I	1.98 G-K
Geary	2.17 F-K	1.70 G-K	. .	1.96 H-K
S-21	2.07 IJK	1.70 G-K	2.33 I	2.20 D-J
Fylking	2.57 B-F	2.20 C-H	2.87 A-I	2.37 A-H
Merion	2.23 E-K	2.33 B-E	3.12 A-F	2.16 D-J
Delta	2.03 IJK	1.90 D-J	2.67 F-I	2.04 G-K
Prato	2.03 IJK	1.43 K	2.47 GHI	2.20 D-J
WK-408	2.13 G-K	. . .	2.70 E-I	2.37 A-H
Birka	2.60 B-E	2.23 B-H	2.93 A-H	2.63 ABC
WK-412	2.10 H-K	2.43 A-D	2.87 A-I	2.47 A-F
Minnesota 6	2.10 H-K	1.90 D-K	2.50 GHI	2.05 G-K
Sodco	2.57 B-F	2.40 A-D	3.20 A-F	2.53 A-D
Primo	2.00 JK	1.90 D-K	2.77 D-I	2.25 C-I
Kenblue	1.93 K	2.00 D-K	2.80 C-I	2.01 H-K
Belturf	2.50 C-H	2.30 B-F	2.97 A-G	2.32 B-I
NJE P-56	2.30 D-K	2.93 A	3.33 ABC	2.11 E-J
NJE P-114	2.20 E-K	2.20 C-H	3.10 A-F	. . .
NJE P-5	2.27 D-K	2.20 C-H	3.37 AB	2.46 A-F
NJE P-35	2.57 B-F	2.23 B-H	2.93 A-H	. . .
Adelphi	2.20 E-K	2.00 D-K	2.77 D-I	. . .
Trenton	2.40 C-J	2.27 B-G	2.97 A-G	. . .
Georgetown	2.33 C-K	2.17 C-I	3.07 A-F	2.27 C-I
PSU K-107	2.33 C-K	2.37 BCD	3.00 A-G	. . .
Zwartberg	2.40 C-J	1.67 H-K	3.07 A-F	. . .
Campus	1.97 K	1.97 D-K	2.87 A-I	. . .
PSU K-162	2.23 E-K	. . .	2.80 C-I	. . .
PSU K-128	2.17 F-K	. . .	2.77 D-I	. . .
K8-146	2.43 C-I	1.73 K	3.23 A-E	2.49 A-E
Aquila	2.73 BC	2.17 C-I	3.23 A-E	2.47 A-F
K8-144	2.93 AB	2.43 A-D	3.37 AB	2.50 A-E
A-10	3.10 A	2.07 C-J	2.90 A-H	1.94 IJK
A-20	3.10 A	2.80 AB	3.30 A-D	1.67 K
Average	2.33	2.09	2.91	2.25
Fertility (kg N/100 m^2)	1.47	1.96	1.96	1.72
Mowing ht (cm)	3.8	1.9	3.8	5.0 & 2.5

**Means with like letters do not differ significantly from each other.*

DIGEST

Kentucky bluegrass (*Poa pratensis* L.) is the most widely used turfgrass in the Northeastern United States and the performance of bluegrass cultivars is of importance to the entire turfgrass industry. In this study, experimental and commercially available bluegrasses were evaluated at 11 locations in 8 states (Conn., Md., N. J., N. Y., Pa., R. I., Vt., and Va.). Plots were established in 1968 and evaluations continued through 1978. Turfgrass quality and density were rated periodically throughout the test and disease resistance ratings were made when diseases occurred. Seedhead development was determined in Pennsylvania, winter survival was rated in Vermont, and thatch accumulation was measured in Maryland, Rhode Island, and Virginia.

Some attractive, low-growing turf-type selections did reasonably well at most locations; however, none of the 43 bluegrasses evaluated was outstanding at all locations. It was established that a genetic-environment interaction exists within the Northeast Region. In general, the highest turf quality occurred with A-20, A-34, Birka, Fylking, Georgetown, Merion, NJE R-35, NJE P-114, PSU K-126, Sodco, Svdsport, Touchdown, and WK-412, while poorest quality occurred with A-10, Arista, Campus, Delta, Geary, Kenblue, Minnesota 6, Patouse, Park, PSU K-162, S-21, South Dakota Certified, and Zwanberg.

The most frequently observed disease was leaf spot, *Helminthosporium* sp. The erect common types of Kentucky bluegrass generally were most susceptible to leaf spot. Selections that were most susceptible to stripe smut, *Ustilago striiformis*, were Cougar, Merion, Newport, Prato, Primo, and Windsor. Leaf rust, *Puccinia poae-nemoralis*, was most severe on Merion, Newport, PSU K-162, and Vantage, and the most susceptible test turf, *Puccinia dramsis*, were Merion, Vantage, and WK-412. Delft, Fylking, Merion, NJE P-114, Pennstar, PSU K-162, and Zwanberg were most susceptible to powdery mildew, *Erysiphe graminis*. Selections most susceptible to dollar spot, *Sclerotinia homoeocarpa*, were Adult, K8-144, K8-145, Nugget, NJE P-114, Nugget, South Dakota Certified, and Windsor were most susceptible to red thread, *Corticium fuciforme*.

A-20, Aquila, Birka, K8-144, Nugget, Pennstar, Sodco, and WK-412 developed the most thatch, and the least thatch was measured with Arista, Campus, Cougar, Delta, Minnesota 6, Patouse, S-21, and South Dakota Certified. The least cold-resistant selections were Aquila, Arista, Campus, Cougar, K8-146, Kenblue, Prato, and South Dakota Certified. Seedhead development, which decreased turf quality, was greatest with A-20, Arista, Campus, Georgetown, Newport, Primo, and Trenton.

Data from this study should be useful in selecting Kentucky bluegrasses that will give more consistent and acceptable long-term performance. Expanded long-term programs and varietal research under different natural and imposed conditions are needed for further evaluation of Kentucky bluegrasses and blends of bluegrasses for use in the northeastern United States.