1974 Turfgrass Research Summary

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(Not for Publication)

A. 1. Indirect Effects of Thatch-Inducing Herbicides on Soil Physical Properties. A. J. Turgeon and I. J. Jansen

Water infiltration into soils underlying thatchy, calcium arsenate-treated turf of Kentucky bluegrass was substantially less than in untreated turf which had no thatch development. The reduced infiltration rate was attributed to poor rooting and the absence of earthworms in soil underlying the calcium arsenate-treated turf. Preliminary data has also shown greater extractable water at low tension levels in the untreated soil compared to soil from the calcium arsenate-treated plots. Additional physical measurements are being made to more fully determine the indirect effects of the thatch-inducing herbicides (calcium arsenate and bandane) on soil properties.

A. 4. c. Effect of Ammonium and Nitrate on Growth and Chemical Composition of Creeping Bentgrass. A. R. Mazur and T. D. Hughes.

Nutrient-sand culture studies were conducted to compare the effects of NH_4^+ and NO_3^- as N sources. These studies were conducted during 3 seasons of the year under greenhouse conditions. The following outlines the procedure. (1) Plants of 'Penncross' creeping bentgrass were vegetatively propagated from stolons. Hoagland's solutions containing either 100 ppm NH_4^+ - N, or 100 ppm NO_3^- -N or 50 ppm NH_4^+ -N plus 50 ppm NO_3^- -N were used. The pH of these solutions was maintained at 6.5 $\pm$ .2. Every 6 days, the solutions were drained from the system, the system flushed with deionized water on the 7th day, and the cycle repeated. (See Agron. J. 66:825 for a detailed description of the system used). (2) Temperature in the greenhouse was maintained at 21 $\pm$ 3°C during Apr-May and Oct-Nov growth periods, but daytime temperatures exceeded this range during July-Aug. During Oct-Nov, natural light was supplemented with tungsten lights to provide a 16-hour photoperiod. (3) After a 6-week growth period, leaf and stolon tissue was harvested. Water soluble carbohydrates were extracted with cold water and quantitatively estimated by the Anthrone method. Total N was determined by Kjeldahl digestion and growth by dry weight of leaf and stolon tissue.

Plants receiving some or all N as NO_3^- produced the greatest amounts of dry matter. Maximum growth was obtained during Apr-May followed by July-Aug and the least amount of growth was obtained during Oct-Nov. Soluble carbohydrate content of leaf and stolon tissue were least in plants receiving only NO_3^-. Lesser amounts of carbohydrates were present for the July-Aug period than in Apr-May or Oct-Nov. Total-N content was greatest for NO_3^- and least for NH_4^+. Seasonal trends in total-N contents were the same as for carbohydrate.

It was thought that a shortage of reducible nucleotides, which are required in carbohydrate metabolism, could account for the poorer growth and higher soluble carbohydrate content of plants receiving only NH_4^+. Evidently, the plant is biochemically better balanced in the presence of NO_3^- in that NO_3^- reduction generates reducible nucleotides used in respiration and then respiration in turn furnishes energy and carbon skeleton for NO_3^- reduction and protein synthesis.

Similar studies were conducted in the field but treatment effects were not noted.

A. 5. a. Release of Nitrogen from IBDU. T. D. Hughes

Several laboratory incubations have been conducted to study the effect of soil pH and fertilizer particle size on N release from IBDU. The following briefly outlines the procedure used in these studies.

(1) Three particle size ranges; .6 to .7 mm, 1.0 to 1.2 mm, and 1.7 to 2.0 mm were added to a silt loam soil at the rate of 300 ppm N. Soil at its original pH of 5.7 was used and $Ca(OH)_2$ was added to raise the soil pH to 7.4.

(2) Soil-fertilizer mixtures were incubated at 22 $\pm$ 1°C and 30$\pm$ 2% moisture for varying time periods.

(3) Extraction of N forms was accomplished by adding 100 ml of 2 M KCl to 20 g soil and shaking for 1 hour followed by filtration.

(4) The concentrations of various N forms were determined by steam distillation of filtered extracts.

Greater NH_4^+ accumulations have consistently been noted in acid soil than in alkaline soil. For .6 to .7 mm particles, NH_4^+ accumulation equivalent to as much as 1/3 of the fertilizer N has been noted. The NH_4^+ accumulation is usually greatest at about 2 to 3 weeks following fertilizer application and disappears as soon as nitrifying organism populations increase which usually is within 6 weeks.

In contrast to NH_4^+ accumulation, NO_3^- accumulation is not affected by soil pH (within the range 5.7 to 7.4). Apparently, the more acidic pH is sufficiently less favorable for the nitrifying organisms to counteract the effects of larger NH_4^+ or energy supplies that accumulate. Total available N, however, is affected by soil pH because of the effects on NH_4^+ accumulations. Urea accumulations were noted in earlier studies, particularly at pH's below 6.0. More recently, this has been shown to be due to hydrolysis of IBDU during the extraction process.

Recovery of N has been rather poor. Recovery of N from .6 to .7 mm particles is 75% after 10 weeks, for 1.0 to 1.2 mm particles about 58% in 21 weeks and for 1.7 to 2.0 mm particles about 50% after 32 weeks. In all cases, release of N was followed until the rates were very slow but evidently considerably longer time intervals (i.e. longer than 10, 21, or 32 weeks) are required for complete release.

Particle size effects have consistently been very large. Apparently this effect can be ascribed to differences in surface area. Soil moisture is also an important factor. Studies are currently being conducted to determine the relative importance of soil moisture.

A. 5. b. Effects of Fertilization and Mowing on Seven Kentucky Bluegrass Varieties. A. J. Turgeon

Six varieties of Kentucky bluegrass, including: Windsor, Nugget, Merion, Fylking, Pennstar and Kenblue, were planted in 1972 and maintained at 1 3/4 inch height through the season. In April of 1973, all of the varieties except Windsor were clipped at 1 1/2 or 3/4 inch, three times per week, and fertilized at an annual rate of 2, 4, 6 or 8 pounds of nitrogen per 1000 sq. ft., applied in one or two pound increments in May, June, August and September. In the fall of 1973, A-20 sod was planted in an adjacent area and included in the study along with Windsor. Thus, seven varieties were observed at eight cultural intensities through 1974. The nitrogen source was a 10-6-4 water-soluble fertilizer. Each treatment combination (mowing height x fertility level) was replicated three times with 4 x 6 ft. plots within each variety.

Results indicate that turfgrass quality is largely dependent upon disease incidence which, in turn, is associated with the mowing height and fertilization rate within each variety (Table 1).

Windsor was unaffected by Fusarium blight but Sclerotinia dollar spot was evident at the lower fertilization levels, especially in the closely clipped (3/4 inch) turf. Turfgrass quality of closely clipped turf maintained at higher fertilization rates was outstanding.

A-20 was unaffected by either Fusarium blight or Sclerotinia dollar spot, but the development of yellowish, circular spots 1 to 1 1/2 inch in diameter (Referred to as "yellow tuft") in plots maintained at low fertility and close mowing seriously reduced turfgrass quality. However, results did indicate that, like dollar spot in other varieties, raising the cutting height or increasing the fertilization level could reduce the incidence of this disease.

Nugget was seriously thinned and discolored by Sclerotinia dollar spot when closely clipped, especially at the lower fertilization levels. The appearance of Nugget during the 1974 season suggests that this variety is not as well adapted to the climatic conditions of central Illinois as it is to the more northerly latitudes.

Merion, Fylking and Pennstar were affected by Sclerotinia dollar spot at close mowing and the lower fertilization levels, while Fusarium blight incidence seriously reduced turfgrass quality at the higher fertilization levels. In some cases, both disease symptoms were evident in the same plot.

Kenblue was seriously blighted with Fusarium at all cultural intensities.

Twenty-two additional varieties of Kentucky bluegrass were planted in September, 1974, for testing under five different cultural intensities including: close mowing (3/4 in) at high (6 lb N/1000 sq ft/yr) and low (2 lb N/1000 sq ft/yr) fertilization; moderate mowing (1 1/2 in) at high and low fertilization; and high mowing (3 in) at minimal fertilization (1 lb N/1000 sq ft/yr) and no irrigation. This is an important extension of the varietal evaluation program in that it is helpful in determining the cultural requirements of individual varieties as well as the adaptation of the varieties to different cultural intensities.

Table 1. Effects of fertilization and mowing height on turfgrass quality of seven Kentucky bluegrass varieties on September 3, 1974.[1]

lb N/100 ft^2			Mowing	Kentucky bluegrass variety						
May	Jun	Aug	height (in)	Windsor	A-20	Nugget	Merion	Fylking	Pennstar	Kenblue
1	0	0	0.75	5.7	6.0	8.0	5.7	5.3	5.0	5.7
1	0	0	1.50	4.7	2.3	5.0	4.7	5.0	5.3	7.0
1	1	1	0.75	3.3	4.3	6.0	5.7	4.7	5.3	6.0
1	1	1	1.50	2.7	2.7	4.7	5.3	5.0	6.0	6.0
2	1	1	0.75	2.3	3.7	5.7	5.3	6.0	7.0	6.7
2	1	1	1.50	2.0	2.3	4.3	5.0	5.3	6.3	7.3
2	2	2	0.75	2.3	3.3	5.0	6.3	7.0	7.3	6.3
2	2	2	1.50	2.0	2.7	3.7	6.7	6.0	7.0	7.0

[1]Table data are the means of three replications. Observations were made using a scale of 1 through 9 with 1 representing best turfgrass quality and 9 representing very poor turf.

A. 7. Effects of Turfgrass Fungicides on Nitrogen Transformations in Soil.
A. R. Mazur and T. D. Hughes

Laboratory and field studies were conducted to study the effects of benomyl, dyrene, and maneb on N transformations in soil. For laboratory studies, the following outlines the procedure.

(1) Benomyl, dyrene, and maneb were added to a Drummer silty clay loam soil at rates of 0, 25, 75, and 150 ppm. Eighty ppm NH_4^+ -N was added using $(NH_4)_2SO_4$.

(2) Soil was incubated at 21 $\pm$ 1°C and 30$\pm$ 1% moisture for 16 weeks.

(3) Concentrations of NH_4^+ -N and (NO_2^- + NO_3^-)-N were determined at various times by steam distillation.

There were large differences in the magnitude of inhibition of nitrification. Almost no effect was detected for benomyl but a complete blockage occurred at the 150 ppm rate of maneb for the entire 16 week incubation period. Dyrene had an intermediate effect. For N mineralization, benomyl was stimulatory whereas both dyrene and maneb were temporarily inhibitory.

In field studies, the procedure was as follows:

(1) Benomyl, dyrene, and maneb were applied to a 'Penncross' creeping bentgrass green at a rate of 180 g of material per 100 m^2 (90, 90, and 135 g active per 100 m^2) at weekly intervals for 14 weeks. Equal portions of N from urea and $Ca(NO_3)_2$ were applied at a rate of 488 g N per 100 m^2 per month June through November.

(2) Soil samples (unamended Drummer silty clay loam) were taken from 0 to 2.5 cm excluding thatch.

(3) Soil was incubated and analyzed as previously described except that 100 ppm N as $(NH_4)_2$ SO_4 was added and the duration of incubation was 5 weeks.

Nitrification was not affected and N mineralization was enhanced by all 3 fungicides. We concluded that the fungicides were degraded under field conditions in the thatch layers. In addition, the stimulation of N mineralization was due to liberation of N that was originally present in the fungicide molecules.

B. 3. Competitive Ability of Kentucky Bluegrass Varieties in Closely Clipped Annual Bluegrass Turf. A. J. Turgeon.

As an extension of the varietal evaluation program, plugs of 49 varieties of Kentucky bluegrass were planted into 3/4-in annual bluegrass turf in August, 1973. Plugs measured four inches (10 cm) in diameter and each variety was replicated four times. The plots were fertilized monthly during the growing season with one pound of nitrogen per 1000 sq ft. Irrigation was performed as needed to maintain the annual bluegrass. After 14 months, plug diameters were measured to determine the competitive ability of the Kentucky bluegrasses in annual bluegrass.

Results showed wide variability among varieties in their competitive ability under the experimental conditions (Table 2). The experimental selections: Ba 61-91, P-140 and RAM #1 ranked quite high on the competitive scale while Park and Galaxy apparently lacked much competitive ability relative to annual bluegrass. This information is of importance in designing a program for controlling annual bluegrass; selection of a variety or blend of varieties that is best adapted to conditions in which annual bluegrass invasion is likely to occur is a critical first step in preventing take-over by annual bluegrass.

B. 3. Effects of Mowing, Fertilization and Competition with Kentucky Bluegrass on Population Density and Tuber Formation in Yellow Nutsedge. D. W. Black and A. J. Turgeon.

Yellow nutsedge is a serious weed of lawns and intensively cultured turfs which has increased in occurrence and distribution during the last several years. Studies were undertaken to determine the effects of cultural practices and Kentucky bluegrass competition on the growth and development of yellow nutsedge.

In one study six yellow nutsedge plants were planted in glass-sided boxes with and without Kentucky bluegrass, and additional boxes were planted with Kentucky bluegrass alone. Half of the boxes were mowed weekly while the other half were unmowed for the first 12 weeks, then mowed weekly for the remainder of the 32-week experimental period. Each treatment combination was replicated three times in the greenhouse. Observations were made on shoot density, below-ground development and tuber formation.

Nutsedge density was highest in boxes in which nutsedge was planted alone and not mowed (Figure 1). Mowing or competition with Kentucky bluegrass substantially reduced nutsedge density during the initial 12 weeks of the experiment; however, the combination of mowing and competition with Kentucky bluegrass held the nutsedge population virtually in check. This same effect was observed eventually in the previously unmowed boxes in which mowing was initiated after the twelfth week; by the twenty-eighth week, nutsedge density in these boxes was at six or less plants per box. Visual observation of the below-ground development of nutsedge revealed considerable rhizome formation in boxes in which nutsedge was planted alone and not mowed, while very little rhizome development was evident where mowing and/or competition with Kentucky bluegrass were factors. Tuber development was zero in mowed boxes and substantial in the unmowed boxes; however, competition with Kentucky bluegrass sharply reduced the amount of tubers produced (Table 3).

In a field study, yellow nutsedge was planted in plots of Kentucky bluegrass turf and maintained at 3/4, 1 1/2 and 3 inches cutting height, and fertilized at 0, 1/2, 1 or 2 lbs N/1000 sq ft/month from May to October. Each plot measured 4 x 6 ft and received 6 nutsedge plants; all treatments were replicated 4 times.

The highest nutsedge density occurred in plots maintained at 3/4 inch (Table 4). Initially, fertilization appeared to enhance nutsedge growth, but this trend was reversed by the end of four months; this was probably due to

Table 2. Competitive ability of Kentucky bluegrass varieties in 0.75-in annual bluegrass turf.

Plug Diameter (cm)	Cultivar
> 10	Ba 61-91
9.9 - 9.0	P-140, RAM #1
8.9 - 8.0	A-20, EVB-305 > P-59, MLM-18001 > P-142, Parade, PSU-190 > Glade, Baron, Brunswick, PSU-169, PSU-150
7.9 - 7.0	P-133, Kenblue > A-34, K1-132 > Adelphi, Sydsport > EVB-391
6.9 - 6.0	K1-143 > Geronimo, Sodco, K1-133, K1-138 > Windsor, Nugget
5.9 - 5.0	Ba62-55, Pennstar, RAM #2, EVB-282, K1-155, 1L-3817 > Victa > Bonnieblue, PSU-197
4.9 - 4.0	K1-187 > Merion, Vantage > Fylking, EVB-307
3.9 - 3.0	K1-131 > Majestic, Campina > Monopoly
2.9 - 2.0	Park > Galaxy

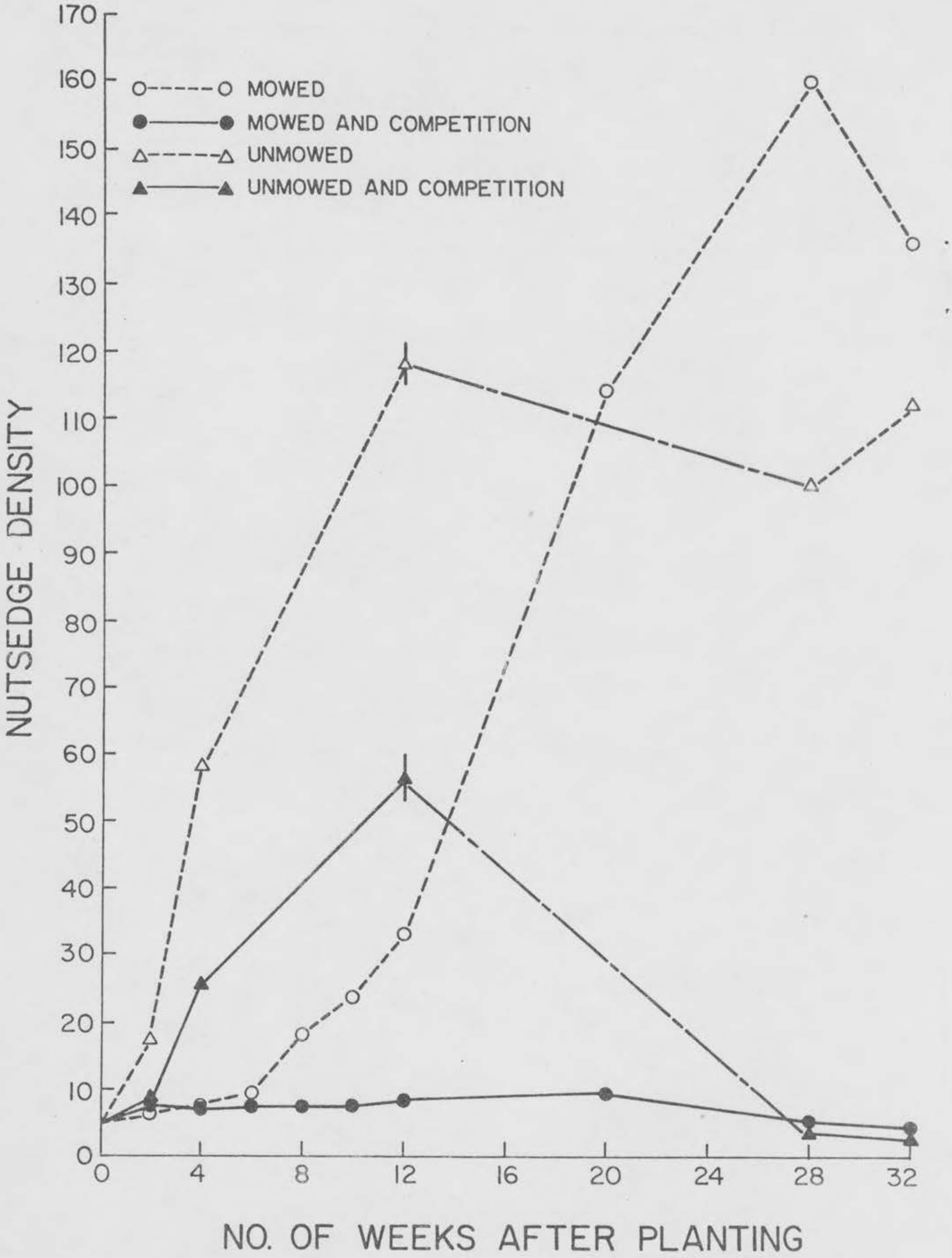

Figure 1. Effects of weekly mowing at 4 cm and competition with Kentucky bluegrass on yellow nutsedge population density.

Table 3. Effect of weekly mowing at 4 cm and competition with Kentucky bluegrass on tuber development in yellow nutsedge after 32 weeks.

	Mowed	Unmowed
	(No. tubers/10 dm^3 soil volume)	
Yellow nutsedge	0	627
Yellow nutsedge + Kentucky bluegrass	0	299

Table 4. Effect of mowing and fertilization on population density of yellow nutsedge in a Kentucky bluegrass turf.[1]

Mowing Height[2] (in)	Fertilization (lb N/1000 sq ft/Mo)	Density[3] 7/5/74	8/20/74	9/26/74
0.75	0	11.0	35.0	32.0
0.75	0.5	14.8	32.0	25.5
0.75	1.0	8.0	32.0	16.8
0.75	2.0	7.8	47.8	22.5
1.50	0	9.8	29.5	23.0
1.50	0.5	12.8	30.0	23.0
1.50	1.0	21.8	38.3	24.8
1.50	2.0	18.3	29.3	7.3
3.0	0	16.0	32.0	14.8
3.0	0.5	24.8	20.0	8.3
3.0	1.0	22.3	14.3	4.0
3.0	2.0	18.8	14.5	2.3

[1]Table values are the means of four replications from a planting of six nutsedge plants/plot on May 26, 1974.

[2]Mowing frequency was 1/wk at 3 in., 2/wk at 1.5 in., and 3/wk at 0.75 in.

[3]No. shoots/24 sq ft plot.

the response of the Kentucky bluegrass to fertilization during the late summer period. Thus, although mowing suppresses nutsedge growth and development, nutsedge is adapted to a mowing regime and its success as a weed in turf is apparently associated with conditions that reduce the competition from Kentucky bluegrass.

D. 1. Effects of Mowing Height and Frequency, and Fertilization on a 'Pennstar-Fylking-Prato' Kentucky Bluegrass Turf. G. Schinderle and A. J. Turgeon.

Mowing is a fundamental cultural practice that distinguishes turfgrass from other plant systems. Numerous effects of mowing height and frequency and fertilization have been reported in various technical publications; yet, some confusion exists due to conflicting conclusions from research results by several workers. A study was initiated in June, 1974, in an attempt to resolve these conflicts. A two-year-old turf of 'Pennstar-Fylking-Prato' Kentucky bluegrass was clipped at cutting heights of 3/4, 1 1/2, or 3 inches once, three times or five times per week. Fertilization levels were 0, 1/2, 1 or 2 lb N/1000 sq ft/month. Data on clipping yield, density, rooting and rhizome development, and turfgrass quality were taken in August and again in October.

Results were fairly consistent with those reported in similar studies; however, several peculiar developments were observed. First, Rhizoctonia brown patch incidence was extensive in all plots mowed at 3/4 inch once per week (Table 5). Disease severity was less where mowing frequency was three times per week and essentially no disease was evident in plots mowed five times per week at 3/4 inch, regardless of fertilization level. Second, the clipping yield of turf mowed five times per week (Monday through Friday) at 3/4 inch was least on the second day of mowing in August after a weekend rest period (Table 6). This directly conflicts with previous reports indicating that clippings should be greatest on the second mowing day (Tuesday) due to a build up of carbohydrates during the weekend rest period to stimulate a burst of new growth following the Monday mowing. Total clipping yield was generally greater from plots mowed only once per week; yet, turfgrass recovery from fertilizer burn in plots mowed at 3/4 inch and receiving 2 lb N/1000 sq ft in July was fastest where mowing frequency was five times per week and slowest in plots mowed only once per week. Thus, clipping yield is not always a good indicator of turfgrass recuperative ability.

D. 2. Effects of Aquatic Herbicides on Penncross Creeping Bentgrass Turf When Applied in Irrigation Water. R. C. Hiltibran and A. J. Turgeon.

Aquatic weeds can present serious problems in irrigation ponds by clogging irrigation lines and pumps, interfering with play on golf courses and detracting from the aesthetic value of the landscape. Attempts at controlling aquatic weeds with herbicides are limited by the subsequent use of the water for irrigating putting greens and other turfs. This experiment was designed to evalute the suitability of various aquatic herbicides in terms of their safety to intensively cultured turf.

The herbicides were added to barrels of water at normal treatment concentrations and the water was then applied to Penncross creeping bentgrass, maintained as putting green turf, at 9.8 gallons per 30 sq ft plot (equivalent

Table 5. Effect of mowing height and frequency, and fertilization on the incidence of Rhizoctonia brown patch disease in a 'Pennstar-Fylking-Prato' Kentucky bluegrass turf in July, 1974.[1]

Mowing Height (in)	Fertilization (lb N/1000 sq ft/mo)	Mowing frequency		
		1/wk	3/wk	5/wk
0.75	0	7.0	4.0	1.0
0.75	0.5	6.5	3.0	1.5
0.75	1.0	7.0	4.0	1.0
0.75	2.0	7.0	4.5	1.0
1.50	0	1.0	1.0	1.0
1.50	0.5	1.0	1.0	1.0
1.50	1.0	1.0	1.0	1.0
1.50	2.0	1.0	1.0	1.0
3.00	0	1.0	1.0	1.0
3.00	0.5	1.0	1.0	1.0
3.00	1.0	1.0	1.0	1.0
3.00	2.0	1.0	1.0	1.0

[1]Disease rating based on a scale of 1 through 9 with 1 representing no disease and 9 representing complete discoloration of the turf.

Table 6. Effect of mowing height and frequency on clipping yield of a 'Pennstar-Fylking-Prato' Kentucky bluegrass turf in August, 1974.[1]

Mowing Height	Fertilization	Mowing Frequency								
	(lb N/M/Mo	1/wk	3/wk			5/wk				
		(g dry wt/60 sq ft)								
0.75	0	96	46	36	33	29	9	9	8	11
0.75	0.5	352	104	63	57	112	28	40	31	35
0.75	1	332	116	71	48	131	24	30	38	28
0.75	2	202	113	64	58	91	29	33	25	30
1.50	0	105	33	20	14	31	13	12	13	12
1.50	0.5	402	129	83	58	94	31	38	19	25
1.50	1	530	102	86	74	132	41	49	24	32
1.50	2	437	117	84	62	107	39	42	22	29
3.00	0	70	30	22	23	45	16	15	16	15
3.00	0.5	255	106	59	51	96	30	22	29	28
3.00	1	274	126	62	66	131	33	33	32	34
3.00	2	211	108	53	50	91	35	23	26	27

to one-half inch of irrigation). Applications were made twice in the Spring study (May 31 and June 3) four times each in the Spring-Summer (May 31, June 3, July 29 and 30) and Summer-Summer (July 30 and 31, August 7 and 8) studies and twelve times in the multiple Summer study (from August 14 to September 17).

Turfgrass injury varied with type and formulation of herbicide, and timing, rate and number of applications (Table 7). No injury was observed in any of the copper sulfate, Cutrine, diuron, fenac, or Hydrathol-47 plots. Diquat, silvex, Aquathol Plus and the ester formulation of 2, 4-D were slightly to moderately injurious depending upon rate and number of applications. Dichlobenil and simazine were moderately to highly injurious resulting in complete loss of turf in some instances.

D. 3. Thatch Development and Other Effects of Preemergence Herbicides on Kentucky Bluegrass Turf. A. J. Turgeon, W. N. Bruce and R. P. Freeborg.

A four-year study showing the thatch-inducing effect of certain preemergence herbicides was concluded in 1974. In addition to thatch development, repeated applications of calcium arsenate and bandane were shown to be associated with higher wilting tendency, greater disease incidence, and reduced root, shoot and rhizome growth (Tables 8, 9, and 10). The inhibitory effects of these herbicides on earthworms is believed to be primarily responsible for the thatch development observed in treated turfs (Table 11). Analysis of the thatch-soil profiles of treated turfs revealed that most of the bandane was confined to the thatch layer while the calcium arsenate residue was more widely distributed through the upper soil region (Table 12). Thus, removal of the thatch in the bandane-treated turf would also remove most of the bandane residue, and redevelopment of the thatch would not be as likely as in the calcium arsenate-treated turf.

D. 4. Effects of Subsurface and Core Cultivation and Topdressing on Soil Strength in a 'Washington' Creeping Bentgrass Turf. A. J. Turgeon and J. C. Siemens.

The traditional means of alleviating soil compaction under an established turf has been through core cultivation techniques. Whether labeled aeration, aerification, hole punching, coring or mini-cultivation, this involves the extraction of small cores of soil which are either removed, or broken up and dragged back into the holes. When cores are removed, topdressing with a prepared soil mixture is sometimes practiced immediately after core cultivation.

A new approach to reducing soil compaction is called subsurface cultivation. A machine is used to penetrate the soil to a depth of approximately five inches to lift and shatter the compacted soil mass. As little experience has been accumulated with this method of cultivation, an experiment was initiated to compare the effects of core versus subsurface cultivations, with and without topdressing.

Table 7. Summary of Injury from Aquatic Herbicides in Irrigation Water on 'Penncross' Creeping Bentgrass Turf[1].

Herbicide	Rate (ppm)	Application Period			
		Spring (1")	Spring (1") Summer (1")	Summer (1") Summer (1")	Multiple Summer (6")
Copper sulfate	1 (Cu)	1	1	1	1
Cutrine	1 (Cu)	1	1	1	1
2, 4-D amine	2	1	1	1	1
2, 4-D ester	2	1	1	1	2
2, 4-D ester	4	1	1	1	4
Diuron	1	1	1	1	1
Hydrathol-47	1 (endothall)	1	1	1	1
Aquathol Plus	1 (endothall)				
	2 (silvex)	--	1	--	5
Silvex	2	1	2	2	7
Fenac	1	1	1	1	1
Simazine	0.5	1	1	1	8
Dichlobenil	1	1	5	8	9
Diquat	1	1	3	2	5
Control	--	1	1	1	1

[1] Injury ratings were made on a scale of 1 through 9 with 1 representing no injury and 9 representing complete necrosis of the turf.

Table 8. Effects of four annual applications of six preemergence herbicides on the wilting tendency of 'Kenblue'-type Kentucky bluegrass turf on July 30, 1973.

Treatment	Rate (kg/ha)	Wilting Tendency*
Bandane	39.2	7.7
Benefin	2.2	1.0
Bensulide	16.8	1.0
Calcium arsenate	439.0	8.3
DCPA	16.8	1.0
Siduron	9.0	1.0
Untreated	---	1.0
LSD	.05	0.6
LSD	.01	0.8

* Wilting tendency ratings are based on a scale of 1 through 9 with 1 representing no wilting and 9 representing severe wilting of the turf.

Table 9. Effects of four annual applications of six preemergence herbicides on *Helminthosporium* leaf spot incidence in 'Kenblue'-type Kentucky bluegrass turf on May 10, 1974.

Treatment	Rate (kg/ha)	Leaf Spot Disease*
Bandane	39.2	6.3
Benefin	2.2	3.7
Bensulide	16.8	3.7
Calcium arsenate	439.0	6.7
DCPA	16.8	3.7
Siduron	9.0	4.0
Untreated	---	3.7
LSD	.05	1.0
LSD	.01	1.4

*Disease ratings are based on a scale of 1 through 9 with 1 representing no disease and 9 representing severe blighting of the turf.

Table 10. Effects of four annual applications of six preemergence herbicides on verdure, roots and rhizomes, and thatch development in 'Kenblue'-type Kentucky bluegrass turf.

Treatment	Rate (kg/ha)	Verdure* (g/10-cm plug)	Roots & Rhizomes (g/10-cm plug)	Thatch (g/10-cm plug)
Bandane	39.2	2.74	1.13	13.56
Benefin	2.2	3.34	8.03	0
Bensulide	16.8	2.85	10.43	0
Calcium arsenate	439.0	2.88	1.0	18.64
DCPA	16.8	3.03	10.22	0
Siduron	9.0	3.18	8.26	0
Untreated	---	4.48	9.28	0
LSD	.05	1.50	2.95	0.71
LSD	.01	2.03	3.97	0.95

* Verdure above-ground shoots

Table 11. Effects of four annual applications of six preemergence herbicides on the soil earthworm (Lumbricus terrestris Linn.) population below a Kentucky bluegrass turf on June 28, 1974.

Treatment	Rate (kg/ha)	Earthworm Counts (#/m^2)
Bandane	39.2	0
Benefin	2.2	64.7
Bensulide	16.8	49.2
Calcium arsenate	439.0	0
DCPA	16.8	47.2
Siduron	9.0	51.9
Untreated	---	53.6
LSD	.05	16.7
LSD	.01	23.3

Table 12. Results of analysis of the thatch-soil profile following four annual applications of bandane at 39.2 kg/ha and calcium arsenate at 439 kg/ha to a 'Kenblue'-type Kentucky bluegrass turf.

Profile depth (cm)	Bandane (ppm)	Calcium arsenate (ppm)
Thatch layer	297.0	291.8
0.0 - 2.5	24.6	183.8
2.5 - 5.0	2.1	89.8
5.0 - 10.0	1.1	41.8
10.0 - 15.0	0.9	19.5

Soil strength measurements made using an ASAE soil cone penetrometer indicated that no significant reduction of soil compaction was obtained from subsurface cultivation, and only a slight reduction of soil compaction resulted in the surface one to two inches from core cultivation two months after treatment (Tables 13 and 14). It was concluded that, in order for subsurface cultivation to be effective, the soil would have to be in a very dry condition; otherwise, the slicing action of the machine would simply compress the soil on either side of the line of penetration.

D. 5. Effects of Chemical Growth Retardants on Kentucky Bluegrass and Tall Fescue. A. J. Turgeon and J. W. Shriver.

Three experimental and two commercially available growth retardants were applied to plots on March 18, April 23 (just after first mowing) or April 25 (two days after first mowing) to evaluate their effects on Kentucky bluegrass and tall fescue turfs. Plots measured 5 x 6 ft and each treatment was replicated three times. Grass height measurements and injury ratings were made on at least two dates following treatment, and yield determinations were made at the conclusion of each test. Seedhead height and percent seedheads (relative to control) were also evaluated in tall fescue.

The experimental materials, CGA-17020 and CGA-24705, reduced the vertical growth of tall fescue from 36 to 63%, and Kentucky bluegrass from 25 to 46% five weeks after application in March (Tables 15 and 16). However, phytotoxicity was moderate to severe depending upon the rate of chemical application. After ten weeks, most of the effects of these materials were no longer apparent, except for the dramatic suppression of seedheads in tall fescue. Chlorflurenol had very little effect on Kentucky bluegrass but was quite phytotoxic to tall fescue. Maleic hydrazide application resulted in some retardation of both grasses, along with substantial phytotoxicity that persisted in tall fescue for at least ten weeks. Sustar was generally more effective on tall fescue than on Kentucky bluegrass, but seedhead suppression was far from complete after 17 weeks.

The April applications of the growth retardants to Kentucky bluegrass produced results similar to those observed from the March treatments, and very little difference was observed from applications just after mowing versus two days after mowing (Tables 17 and 18). In tall fescue, treatment just after mowing appeared to reduce seedhead production more that the treatments applied two days after mowing (Tables 19 and 20). Results were fairly consistent with those obtained from the March treatments except that phytotoxicity was generally less with April applications of the growth retardants.

E. 1. a. Control of White Clover in Kentucky Bluegrass Turf with Postemergence Herbicides. A. J. Turgeon and H. Portz.

Various herbicide compounds and formulations were applied to a white clover-infested Kentucky bluegrass turf in Belleville, Illinois on August 8, 1974. Plots measured 5 x 6 ft and each treatment was replicated three times. Control ratings were made on November 15, 1974.

Silvex, dicamba and Dow M-3785 provided nearly complete control of the clover while mecoprop (MCPP) treatments resulted in only moderate control. Dacamine was more effective against clover than the amine form of 2, 4-D, but control was far from complete (Table 21).

Table 13. Effects of cultivation and topdressing on soil strength in a 'Washington' creeping bentgrass turf treated August 16, 1973 and measured with a core penetrometer on October 11, 1973.[1]

Cultivation[2]	Topdressing[3]	Depth, inches[4]							
		0	T	1	2	3	4	5	6
Subsurface	+	11.1	14.5	12.0	15.9	20.2	19.6	16.6	14.5
Subsurface	-	10.8	15.0	11.2	14.4	18.7	17.2	15.5	12.9
Coring	+	10.1	13.7	10.3	12.9	19.8	18.7	15.2	12.2
Coring	-	9.5	12.2	10.0	13.7	19.4	17.1	14.2	12.8
None	+	10.7	14.2	11.0	14.4	19.3	18.3	16.0	13.7
None	-	10.2	13.8	10.8	13.6	17.9	16.2	13.8	11.7
LSD .05		0.7	1.1	0.9	1.4	2.2	3.3	2.8	2.3

1 Table values are the means of three replications per plot, and three plots per treatment. Measurements were made with an ASAE soil core penetrometer.

2 Cultivation methods included: Subsurface cultivation using a Jacobsen's Sod Master Sub-Air with 5 inch knives; and core cultivation using a Ryan Greens Air with 0.5 inch hollow tines.

3 Topdressing was performed with a 1:1 mixture of coarse sand and silty clay loam soil applied at the rate of 0.25 $yd^3/1000\ ft^2$.

4 Depth measurements were made at 1 or 2 inch increments plus the point at which the core penetrated the thatch (T).

Table 14. Effects of cultivation and topdressing on soil strength in a 'Washington' creeping bentgrass turf treated August 16, 1973 and measured on August 21, 1974.[1]

Cultivation[2]	Topdressing[3]	Depth, inches[4]							
		0	T	1	2	3	4	5	6
Subsurface	+	8.2	13.5	11.1	12.6	15.9	14.4	11.3	9.9
Subsurface	-	8.3	13.3	10.2	12.1	15.5	13.0	10.7	9.4
Coring	+	7.8	11.2	8.8	10.3	15.1	14.3	11.7	9.8
Coring	-	8.0	12.1	9.1	12.1	15.8	13.7	10.5	8.7
None	+	8.1	13.6	10.8	13.0	16.2	13.8	11.4	9.9
None	-	9.2	13.5	10.2	12.1	15.3	13.4	9.9	9.1
LSD .05		1.1	1.4	1.9	1.5	2.1	3.4	2.5	2.4

1 Table values are the means of three replications per plot, and three plots per treatment. Measurements were made with an ASAE soil core penetrometer.

2 Cultivation methods included: subsurface cultivation using a Jacobsen's Sod Master Sub-Air with 5 inch knives; and core cultivation using a Ryan Greens Air with 0.5 inch hollow tines.

3 Topdressing was performed with a 1:1 mixture of coarse sand and silty clay loam soil applied at the rate of 0.25 $yd^3/1000\ ft^2$.

4 Depth measurements were made at 1 or 2 inch increments plus the point at which the core penetrated the thatch (T).

Table 15. Effects of chemical growth retardants on foliar height, plant injury, and yield of Kentucky bluegrass turf treated on March 18, 1974[1].

Treatments	Form	Rate (lb/A)	Time after application, weeks					
			5		10		17	
			Fol. Ht., cm	Phyto	Fol. Ht., cm.	Phyto	Fol. Ht., cm.	Yield, kg/m^2
CGA-17020	4E	2.5	1.8	3.0	9.2	0	41.8	1.35
"	4E	5.0	1.5	4.0	5.3	0	37.5	1.27
"	4E	7.5	1.3	5.7	4.8	0	31.8	0.83
"	5G	2.5	1.6	3.7	6.5	0	36.8	1.35
"	5G	5.0	1.6	4.3	6.2	0	38.3	1.35
"	5G	7.5	1.6	4.3	6.0	0	39.3	1.40
CGA-24705	6E	2.5	1.8	3.7	7.8	0	37.5	1.31
"	6E	5.0	1.5	4.7	7.0	0	36.8	1.11
"	6E	7.5	1.7	5.0	5.7	0	40.0	1.71
Chlorflurenol	1E	3.0	2.7	1.7	7.3	0	41.8	1.48
Maleic hydrazide	2S	4.0	2.2	3.0	5.5	0	36.8	1.41
Sustar	2S	2.0	1.8	2.0	7.0	0	38.3	1.23
Control	-	-	2.4	0	7.5	0	36.8	1.42

Table 16. Effects of chemical growth retardants on foliar height, plant injury, and yield of tall fescue turf treated on March 18, 1974[1].

Treatments	Form	Rate (lb/A)	Time after application, weeks							
			5		10		17			
			Fol. Ht., cm	Phyto	Fol. Ht., cm	Phyto	Fol. Ht., cm	Yield, kg/m^2	Seedhead Ht.	% Seedheads
CGA-17020	4E	2.5	4.1	1.7	16.7	0	64.3	2.58	88.3	65.0
"	4E	5.0	3.0	4.3	9.3	0	67.5	3.45	72.5	4.0
"	4E	7.5	2.7	6.3	12.2	0	61.8	2.56	73.3	2.0
"	5G	2.5	3.6	3.7	22.7	0	66.8	2.76	93.3	33.0
"	5G	5.0	2.9	5.0	16.2	0	67.5	2.93	82.5	6.3
"	5G	7.5	2.6	5.7	13.2	0	58.3	3.14	68.8	2.3
CGA-24705	6E	2.5	4.1	2.0	14.0	0	65.0	3.21	78.3	7.0
"	6E	5.0	3.2	4.3	10.3	0	60.8	2.82	57.5	0.3
"	6E	7.5	2.3	6.3	6.7	5.3	50.8	2.29	--	0.3
Chlorflurenol	1E	3.0	4.1	5.0	12.3	3.0	60.0	2.23	70.8	4.3
Maleic hydrazide	2S	4.0	2.8	3.3	13.5	2.7	59.3	2.52	72.5	4.3
Sustar	2S	2.0	2.8	4.0	19.3	0	65.8	2.46	90.0	40.0
Control	--	--	6.4	0	29.7	0	50.8	2.45	95.0	100.0

Table 17. Effects of chemical growth retardants on foliar height, plant injury, and yield of Kentucky bluegrass turf treated just after mowing on April 23, 1974.

Treatments	Form	Rate (lb/A)	Time after application, weeks			
			5		12	
			Fol. Ht., cm	Phyto	Fol. Ht., cm.	Yield, kg/m^2
CGA-17020	4E	2.5	6.4	0.3	34.3	1.33
"	4E	5.0	5.8	0.7	37.5	1.31
"	4E	7.5	3.6	3.3	29.3	0.76
"	5G	2.5	4.3	1.0	31.8	0.91
"	5G	5.0	3.7	2.0	25.8	0.79
"	5G	7.5	3.4	2.7	20.8	0.55
CGA-24705	6E	2.5	6.4	0	39.3	1.53
"	6E	5.0	3.9	2.0	25.0	0.65
"	6E	7.5	3.7	0.3	26.8	0.60
Chlorflurenol	1E	3.0	5.3	2.3	35.8	1.33
Maleic hydrazide	2S	4.0	3.6	1.3	26.8	0.74
Sustar	2S	2.0	4.0	1.0	25.8	0.79
Control	--	---	5.9	0	35.8	1.50

Table 18. Effects of chemical growth retardants on foliar height, plant injury, and yield of Kentucky bluegrass turf treated two days after mowing on April 25, 1974.

Treatments	Form	Rate (lb/A)	Time after application, weeks			
			5		12	
			Fol. Ht., cm	Phyto	Fol. Ht., cm.	Yield, kg/m^2
CGA-17020	4E	2.5	4.9	0.7	29.3	0.88
"	4E	5.0	3.6	2.3	28.3	0.68
"	4E	7.5	3.3	1.7	27.5	0.89
"	5G	2.5	3.0	3.0	17.5	0.36
"	5G	5.0	2.6	3.3	14.3	0.27
"	5G	7.5	2.5	4.0	15.8	0.24
CGA-24705	6E	2.5	3.9	1.3	18.3	0.44
"	6E	5.0	3.5	2.0	20.8	0.43
"	6E	7.5	3.4	3.3	15.8	0.28
Chlorflurenol	1E	3.0	4.7	0	31.8	0.95
Maleic hydrazide	2S	4.0	4.1	0.7	35.0	1.10
Sustar	2S	2.0	3.0	3.0	22.5	0.58
Control	--	---	5.4	0	29.3	0.80

Table 19. Effects of chemical growth retardants on foliar height, plant injury, and yield of tall fescue turf treated just after mowing on April 23, 1974.

Treatments	Form	Rate (lb/A)	Time after application, weeks: 5		12			
			Fol. Ht., cm	Phyto	Fol. Ht., cm	Yield, kg/m^2	Seedhead Ht., cm	% Seedheads
CGA-17020	4E	2.5	9.0	0	57.5	2.42	65.0	7.0
"	4E	5.0	7.0	1.3	55.8	2.42	51.8	1.3
"	4E	7.5	5.3	2.0	53.3	2.04	47.5	0.3
"	5G	2.5	9.0	0.3	57.5	2.32	67.5	8.0
"	5G	5.0	8.3	1.3	52.5	2.12	55.0	2.7
"	5G	7.5	6.0	1.7	55.0	2.58	60.0	2.3
CGA-24705	6E	2.5	11.7	0.7	53.3	1.98	69.3	17.0
"	6E	5.0	8.3	2.0	45.0	1.72	58.3	5.7
"	6E	7.5	6.3	2.7	40.8	1.62	55.0	3.0
Chlorflurenol	1E	3.0	12.0	1.3	46.8	1.97	61.8	12.0
Maleic hydrazide	2S	4.0	8.0	0.7	48.3	2.02	57.5	0.3
Sustar	2S	2.0	9.0	0	56.8	2.45	58.3	3.0
Control	--	---	19.0	0	49.3	2.05	86.8	100.0

Table 20. Effects of chemical growth retardants on foliar height, plant injury, and yield of tall fescue turf treated two days after mowing on April 25, 1974[1].

Treatments	Form	Rate (lb/A)	Time after application, weeks					
			5		12			
			Fol. Ht., cm	Phyto	Fol. Ht., cm	Yield kg/m^2	Seedhead Ht., cm	% Seedheads
CGA-17020	4E	2.5	14.7	0.3	53.3	2.18	82.5	65.0
"	4E	5.0	9.7	1.0	50.0	1.97	58.3	4.0
"	4E	7.5	7.0	2.3	50.0	2.04	56.3	1.0
"	5G	2.5	12.0	0.3	52.5	1.87	69.3	10.0
"	5G	5.0	6.7	2.0	46.8	1.78	57.3	3.0
"	5G	7.5	6.3	2.7	50.8	1.92	45.0	1.0
CGA-24705	6E	2.5	16.7	0	46.8	1.84	85.8	82.0
"	6E	5.0	15.0	0.3	46.8	1.56	70.8	25.0
"	6E	7.5	10.3	2.0	38.3	1.26	62.5	7.0
Chlorflurenol	1E	3.0	12.3	2.3	49.3	2.00	64.3	5.0
Maleic hydrazide	2S	4.0	9.0	0.7	57.5	1.97	52.5	1.0
Sustar	2S	2.0	8.0	0	50.8	2.09	55.0	2.3
Control	--	--	18.0	0	45.8	1.87	90.0	100.0

Table 21. White clover control with herbicides.

Treatment	Rate (lb/acre)	Control Rating[1]
2, 4-D (amine)	1	1.3
Silvex	1	8.7
Mecoprop	1	6.3
Dicamba	1/2	8.3
2, 4-D (Dacamine)	1	4.3
2, 4-D + Mecoprop	1 + 1/2	6.3
2, 4-D + Dicamba	1 + 1/2	8.3
2, 4-D Lithate + Dicamba	1 + 1/4	7.7
Bromoxynil	3/4	1.3
Dow M-3785	1/8	8.3
Control	---	1.0

[1]Control ratings based on a scale of 1 through 9 with 1 representing no control and 9 representing complete control.

E. 1. b. Evaluation of Preemergence Crabgrass Herbicides in Turf. A. J. Turgeon.

Preemergence herbicides were applied in April to established Kentucky bluegrass that had been vertically mowed and overseeded with crabgrass. Plots measured 5 x 6 ft and each treatment was replicated three times. The plots were monitored for crabgrass germination and turfgrass injury, and control data was taken in late August. Additional studies were performed at Belleville with several preemergence herbicides to determine turfgrass injury from applications to 'Penncross' creeping bentgrass, maintained as putting green turf, and Kentucky bluegrass that was partially submerged under water at the time of treatment.

Results from the crabgrass control test showed good to excellent control with Betasan, Dacthal, Balan, Emblem, PPG-139, Ronstar and Tolban (Table 22). Devrinol and EL-131 also provided good crabgrass control at adequate application rates, but turfgrass injury was moderate to severe indicating a rather narrow margin of safety. Modown, Vel-4207 and Vel-5052 were ineffective in controlling crabgrass at the applied rates. The compounds, CGA-17020 and CGA-24705 were highly injurious to the turf resulting in negative crabgrass control.

No significant increase in crabgrass control was obtained from watering in the Emblem, Balan and Alachlor treatments. Repeated treatments of Emblem improved control over the single applications. Two applications of the Dacthal WP or F formulations at 5.3 lb/acre were as effective in controlling crabgrass as single applications at 10.5 lb/acre or higher.

Phytotoxicity to 'Penncross' creeping bentgrass turf was substantial following treatment with EL-131, moderate with Ronstar and calcium arsenate, and very slight with Betasan (Table 23).

When preemergence herbicides were applied to partially submerged Kentucky bluegrass, Dacthal treatment resulted in severe injury to the turf while phytotoxicity was moderate from EL-131, Emblem and Ronstar (Table 24). The surprising effect of Dacthal may be of practical concern in situations where aerial application is contemplated due to partially submerged conditions in spring.

E. 1. c. Chemical Control of Yellow Nutsedge in Turf. D. W. Black and A. J. Turgeon.

Herbicides were applied for controlling yellow nutsedge infestations in Kentucky bluegrass turf on July 31, 1974, at two sites. Site #1 was a golf course tee maintained at 3/4-in cutting height with a natural uniform infestation of nutsedge along one side. Half of the plots were not mowed for seven days prior to treatment while the other plots were mowed the day before treatment. Herbicides were applied at various rates; repeat applications and the addition of surfactant to the spray solution were also included in the test. Control estimates were made approximately three and seven weeks after

Table 22. Crabgrass control and turfgrass injury from preemergence herbicides applied in April 1974.

Treatment	Form[2]	Rate lb/A	Crabgrass % cover	Crabgrass % control	Phytotoxicity[5]
Alachlor	4E	3	13.3	50	1.0
		3[3]	17.7	34	1.0
		6	7.0	74	1.0
		6[3]	8.7	67	1.0
Balan	2.5G	2.5	2.7	90	1.0
		2.5[3]	1.7	94	1.0
Betasan	4E	7.5	0.3	99	1.0
		10	0	100	1.0
	3.6G	7.5	0	100	1.0
		10	1.7	94	1.0
	12.5G	7.5	1.0	96	1.0
CGA-17020	5G	1	43.3	-62	1.0
		2	41.7	-56	1.0
	4E	2	25.0	6	1.0
CGA-24705	5G	1	48.3	-81	3.0
			45.0	-69	2.0
	6E		19.3	28	1.0
Dacthal	75WP	10.5	0	100	1.0
		15	1.0	96	1.0
	6F	10.5	0	100	1.0
		15	0.3	99	1.0
	75WP	10.5+5.3[4]	0.3	99	1.0
		5.3+5.3[4]	0.7	97	1.0
	6F	10.5+5.3[4]	0	100	1.0
		5.3+5.3[4]	0.3	99	1.0
Devrinol	2E	2	8.7	67	3.0
		4		100	6.0
EL-131	50WP	1.5	1.7	94	2.0
		3	2.0	93	6.7
		6	0	100	8.0
Emblem	25WP	2.5	11.7	56	2.0
		2.5[3]	6.7	75	1.0
		2.5+2[4]	0.3	99	2.0
		2.5+2[3,4]	1.7	94	1.0

Treatment	Form[2]	Rate lb/A	Crabgrass % cover	Crabgrass % control	Phytotoxicity[5]
Modown	80WP	2	18.3	31	1.0
		4	11.7	56	1.0
PPG-139	5G	10	0.3	99	1.0
		15	1.0	96	1.0
		20	0.7	97	1.0
PPG-139	3F	10	6.0	78	1.0
		15	0.7	97	1.0
		20	0	100	2.0
Ronstar	2G	2	2.7	90	1.0
		3	1.0	96	2.0
		4	0	100	3.0
Tolban	2G	1	6.0	78	1.0
		2	3.7	86	1.0
		3	2.7	90	1.0
Vel-4207	2E	1	26.7	0	1.0
		2	25.0	6	1.0
		4	13.3	50	2.0
Vel-5052	2E	0.25	21.7	5	1.0
		0.5	30.0	-12	1.0
		1.0	18.3	31	1.0
Untreated			26.7		1.0

[1]Table values are the means of three replications.

[2]E = emulsifiable concentrate, G = granular, WP = wettable powder and F = flowable.

[3]These treatments were <u>not</u> watered in after application.

[4]The second application was made on June 10. All initial applications were made April 26, 1974.

[5]Phytotoxicity based on a scale of 1 to 9 with 1 representing no injury and 9 representing complete necrosis of the turf.

Table 23. Turfgrass injury from preemergence herbicides applied to 'Penncross' creeping bentgrass in April 1974.[1]

Treatment	Form	Rate lb/A	Phytotoxicity
Betasan	4E	10	1.7
	12.5G	10	1.3
Ronstar	2G	3	2.7
EL-131	50WP	3	4.7
Calcium arsenate	70WP	186	2.7
Untreated			1.0

[1]Table values are the means of three replications; phytotoxicity based on a scale of 1 to 9 with 1 representing no injury and 9 representing complete necrosis of the turf.

Table 24. Turfgrass injury from preemergence herbicides applied to Kentucky bluegrass partially submerged under water in April 1974.[1]

Treatment	Form	Rate lb/A	Phytotoxicity
Alachlor	4E	3	2.0
Balan	2.5G	1.5	1.7
		3	1.3
Betasan	12.5G	10	1.7
Dacthal	6F	12	4.7
	75WP	12	5.3
EL-131	50WP	1.5	2.3
		3	3.3
Emblem	25WP	1.5	2.3
		3	3.0
Ronstar	2G	3	2.7
Tupersan	50WP	12	1.7
Untreated			1.0

[1]Table values are the means of three replications; phytotoxicity based on a scale of 1 to 9 with 1 representing no injury and 9 representing complete necrosis of the turf.

initial treatment. Plugs were extracted from each plot and nutsedge tubers were separated and counted.

At site #2 six yellow nutsedge plants were planted in each plot in late May in order to develop a uniform infestation for herbicide evaluation. Nutsedge plant counts were made at approximately three and eight weeks after initial treatment.

Nutsedge control at site #1 was best in plots receiving two applications of any of the three herbicides under evaluation (Table 25). Where effective control of the nutsedge shoots was observed, tuber development was also substantially reduced. The variation in mowing practices did not appear to affect the results from chemical treatment. Some temporary discoloration was observed in the MAMA-treated plots while no injury was evident from the bentazon or cyperquat treatments. There was substantial variability among replications that was associated with differences in irrigation coverage; generally better control was observed in the more intensively irrigated plots. Based on this observation and subsequent greenhouse tests, it was concluded that frequent irrigation for a period of several weeks prior to herbicide treatment enhances control of yellow nutsedge.

Results at site #2 were generally consistent with those at site #1; drenching in the chemical treatments did not enhance control, and may actually reduced efficacy (Table 26). Perfluidone was highly injurious to the turf, especially where drenched in, while deterioration of the nutsedge plants was very slow. The combination of 2,4-D and dicamba did not provide satisfactory control of nutsedge.

E. 2. b. Fungicide Evaluations on Bentgrass Putting Green Turf. G. W. Simone, M. C. Shurtleff, and A. J. Turgeon.

Ten commercial and experimental fungicides were evaluted for their control of Sclerotinia dollar spot and Rhizoctonia brown patch on 'Seaside' creeping bentgrass. Several rates and spray intervals were used on the test plots. The randomized test plots were 6 x 10 feet (total area 4,080 sq ft) and were replicated four times (untreated check had six replications). All applications were made with a Hudson Matador Sprayer and Spray Hawk spray boom.

Fungicide for evaluation and technical assistance were contributed by the following chemical companies: the Chemagro Chemical Corporation (BayDam 18654 and Dyrene); Diamond Shamrock Corporation (Daconil 6F); Dow Chemical [(Dowco 269, Nurelle)]; E. I. duPont deNemours & Company (DPX 164 and Tersan 1991); Mallinckrodt Chemical Works (MF-573); Rhodia Incorporated (RP 26019); Rohn and Haas Company (RH-3928, Dithane M-45); UpJohn Company (Actidione TGF); and Vesicol Chemical Corporation (Phosvel).

Sclerotinia dollar spot first appeared in early June and subsequent disease development was light. Hot, dry weather in combination with well maintained nitrogen level (top dressing of Milorganite in the first week of June) and well maintained moisture levels at field capacity did not favor Sclerotiniadisease development. A moderate incidence of Rhizoctonia brown patch occurred in mid-August with notes taken on August 26 (Table 27).

Table 25. Effects of herbicides on control of yellow nutsedge in Kentucky bluegrass turf.

Treatments	Rate lb/A	Mowing[3]	% Control (8/23/74)	% Control (9/20/74)	Tubers (#/4" plug)
Bentazon	1.5	+	87	92	1.3
	1.5	-	57	73	4.3
	3	+	53	75	1.7
	3	-	69	94	3.3
	1.5 + 1.5[2]	+	60	100	1.7
	1.5 + 1.5[2]	-	51	100	2.0
+ S[1]	1.5	+	66	94	6.0
+ S[1]	1.5	-	77	84	5.5
Cyperquat	2	+	72	97	3.3
	2	-	64	02	14.0
	4	+	86	94	8.0
	4	-	71	90	0.7
	2 + 2[2]	+	69	100	0
	2 + 2[2]	-	96	100	0
MAMA	1.5	+	15	0	14.0
	1.5	-	10	0	14.0
	3	+	84	96	2.7
	3	-	78	99	0.3
	1.5 + 3[2]	+	17	100	6.3
	1.5 + 3[2]	-	40	100	1.0
Control			0	0	19.0

[1]S = surfactant (Citowett at 0.5% of spray solution)

[2]Second applications were made August 23, 1974

[3]Unmowed (-) for seven days prior to treatment vs. mowed (+) one day prior to treatment at 0.75 inches.

Table 26. Effects of herbicides on yellow nutsedge density in Kentucky bluegrass turf.

Treatments	Rate lb/A	# Nutsedge Plants/24 (8/23/74)	(9/26/74)
Bentazon	1.5	1.3	0.3
	3	0.7	0
	6	1.0	0
	3 + 3[3]	1.7	0
(drench)[1]	3	2.3	1.0
+S[2]	3	1.3	0.3
+2, 4-D	3 + 1	1.0	2.7
Cyperquat	2	0	0
	4	0	0
	8	0	0
	4 + 4[3]	0	0
(drench)[1]	4	0	0
+S[2]	4	0	0
MAMA	1.5	6.7	4.3
	3	0	0
	1.5 + 3[3]	2.7	0
Perfluidone	6	10.6	0.7
	12	12.0	1.3
(drench)[1]	6	17.0	5.7
2, 4-D + dicamba	1 + 0.25	6.3	3.7
	2 + 0.5	12.0	4.7
+S[2]	1 + 0.25	14.3	6.3
Control		18.0	9.3

[1]These treatments were applied in 2700 gal. H_2O/A.

[2]S = surfactant (Citowett @ 0.5% of spray solution).

[3]Second applications were made on August 23, 1974.

Table 27. Fungicidal control of Sclerotinia Dollar Spot and Rhizoctonia Brown Patch on Seaside Creeping Bentgrass at the Ornamental Horticulture Research Center, Urbana, Illinois.

Fungicide	Rate[b] (oz./1,000 sq. ft.)	Application[b] interval (days)	Sclerotinia dollar spot[c] July 1	Sclerotinia dollar spot[c] July 31	Sclerotinia dollar spot[c] August 26	Rhizoctonia[d] brown patch August 26
RP 26019	4.0	10	.00	.00	.00	15.0
RP 26019	8.0	10	.00	.00	.00	2.5
Dowco 269 & Dyrene	1.4	10	.00	.00	.00	10.0
RH-3928 & Dithane M-45	4.0	14	.00	.00	.00	5.0
RH-3928 & Dithane M-45	8.0	14	.00	.00	.00	5.0
MF-573	4.0	7	.00	.00	.00	5.0
MF-573	12.0	7	.00	.00	.00	.0
DPX 164	4.0	7	.00	.00	.00	.0
Acti-dione TGF	1.0	7	.00	.00	.00	10.0
Tersan 1991 & Dyrene[a]	2.4	14	.00	.00	.00	.0
Tersan 1991 & Dyrene[a]	3.5	14	.00	.00	.00	.0
Phosvel	1.5	14	.02	.00	.00	10.0
Phosvel & Dyrene	1.5:3	14	.00	.00	.00	2.5
Dowco 269 & Daconil 6F.	1:1/4 pt.	10	.00	.00	.00	.0
Daconil 6F	1/4 pt.	10	.00	.00	.00	.0
Check (untreated)	---	--	.02	.00	.02	33.0

[a]Tersan 1991 substituted for Bay Dam 18654 as of June 27, upon withdrawal of Bay Dam from the testing program by Chemagro Corp.
[b]Rate of application and application intervals were determined by label instructions or manufacturer's suggestion.
[c]Dollar spot ratings were based on a scale of 0 to 5 (0 = no dollar spot; 5 + severe dollar spot).
[d]Brown patch ratings were based on the percent of plot area diseased.

All 10 fungicides, in all combinations and at all application intervals, provided excellent control of Sclerotinia dollar spot in view of the mild disease incidence (Table 27).

Excellent control of Rhizoctonia brown patch was obtained with MF-573 (12 oz. rate), DPX 164, Tersan 1991, Dyrene (3:5 mixture), Acti-dione TGF, Dowco 269 and Daconil 6F mixture, and Daconil 6F alone. The double rate of RP 26019 proved superior to the 4 oz. rate while no difference was noted between the single and double rates of RH-3928 + Dithane M-45 in providing fair control of brown patch. The 4 oz. rate of MF-573 also provided fair control in this trial. The Phosvel and Dyrene combination (1.5:3 rate) provided superior control over Phosvel alone. The 4 oz. rate of RP 26019, the Dowco 269 and Dyrene combination, the Tersan 1991 and Dyrene (2:4 rate), and the Phosvel alone failed to check brown patch development.

E. 3. Annual White Grub Control Trials. R. Randell.

Annual white grub, Cyclocephala immaculata, numbers were above average again, especially in central Illinois. Damage began to appear later than usual, approximately the last week of September. Chlordane applications were applied to many infested areas without satisfactory control. Diazinon was applied with varying results.

A series of plots were established on a 23,000 sq ft home lawn. The turfgrass in this area was infested with 7 to 55 grubs per square foot. Eight plots were established with 2000 sq feet of turfgrass area in each plot. These areas were treated on October 5. The insecticides used were as follows: Diazinon AG 500, 4 lb. per gallon at the rate of 1 cup per 2000 sq ft or 5 lb. active ingredient per acre; trichlorfon (Proxol), 80 percent S.P. at the rate of 7 1/2 ounces per 2000 sq ft or 8.5 lb. active ingredient per acre; chloropyrifos (Dursban) 2 E at the rate of 6 ounces per 2000 sq ft or 2 lb. active ingredient per acre. Dyfonate was applied using two granular formulations and two rates. Dyfonate 2G was applied at 40 ounces per 1000 sq ft or 2 lb actual per acre, and 80 oz per 1000 sq ft or 4 lb rate per acre. Dyfonate 10G was applied at 8 oz per 1000 sq ft or 2 lb per acre and 16 oz per 1000 sq ft or 4 lb per acre. One area was not treated. All treated plots were irrigated immediately after being applied. Grub counts were made on October 12, one week after application, another on October 16, and a final count on October 26. In five one sq ft samples in each treatment, the sod was rolled back and live, moribund, and dead grubs counted. For the last count made on October 26, only two samples were checked in each treatment area.

Numbers of live grubs were reduced in all treated plots (Table 28). Diazinon and Proxol effectively reduced the grub numbers after 11 days or for the second counts made. Diazinon, Proxol and the 4 lb per acre rate of Dyfonate gave good control of grubs after 3 weeks.

Diazinon and trichlorfon will continue to be listed for control of annual white grubs in turfgrass in our insect control suggestions from Extension Entomology. It is very important that the treatments be drenched into the root zone to be effective. Dyfonate is not labeled for use on turfgrass.

Table 28. Annual white grub control with insecticides.

Insecticide	Rate (oz./1000 sq. ft.)	Rate (lb. a.i./acre)	Days after Treatment - Grubs/sq. ft. 7 days Live	7 days Mor.	7 days Dead	7 days Total	11 days Live	11 days Mor.	11 days Dead	11 days % Reduction	21 days Live	21 days Mor.	21 days Dead	21 days % Reduction
Diazinon AG500	4 oz.	5	4.2	8.2	3.0	15.4	1.0	5.2	4.0	93.5	1.0	2.5	1.0	93.5
Proxol 80SP	3 3/4 oz.	8.5	1.4	8.0	0.6	10.0	0.6	3.0	4.4	94.0	0	0.5	5.0	100
Dursban 2EC	3 oz.	2	11.8	4.0	0	15.8	6.2	3.6	0.2	60.8	7.5	1.5	0	52.5
Dyfonate 2G	40 oz.	2	10.4	11.2	3.8	25.4	11.4	13.4	1.0	55.1	3.0	4.5	0.5	88.2
Dyfonate 2G	80 oz.	4	8.4	12.6	1.8	22.8	7.6	5.2	1.0	66.7	4.0	7.5	5.0	82.5
Dyfonate 10G	8 oz.	2	4.8	2.4	0	7.2	4.8	3.8	0.6	33.3	2.5	2.5	0	65.3
Dyfonate 10G	16 oz.	4	11.8	7.6	0	19.4	6.2	8.4	0.8	68.0	2.0	2.5	0.5	89.7
Untreated	---	---	12.4	0	0	---	---	---	---	---	---	---	---	---

F. 4. Vegetative Establishment of Kentucky Bluegrass. E. G. Solon and A. J. Turgeon.

Various methods of vegetative establishment of Kentucky bluegrass turf were studied over a two-year period. Planting of shredded sod (rhizomizing) at various rates with various amounts of topdressing soil was evaluated. Results indicated that successful turfgrass establishment was possible but too slow to be of much practical value (Table 29).

Small sections of sod (plugs) were placed in prepared soil as an alternative vegetative planting technique. Results showed this to be a feasible method of establishing Kentucky bluegrass turf. However, where companion grasses were seeded in conjunction with plugging, the spreading growth of the plugs was severely retarded (Table 30). Other studies revealed that preemergence herbicides could be applied immediately after planting plugs to prevent the development of annual weeds without inhibiting turfgrass establishment (Table 31). The most outstanding material in this test was oxadiazon (Ronstar), which effectively controlled annual bluegrass, crabgrass and other weeds while allowing 'A-20' Kentucky bluegrass plugs to form solid turf. Thus, plugging plus application of oxadiazon is a promising technique for establishing Kentucky bluegrass in soil containing large quantities of weed seed.

G. 3. a. Kentucky Bluegrass Variety Evaluation. A. J. Turgeon.

The intraspecific variability of Kentucky bluegrass has allowed the development of many varieties and experimental selections that differ widely in their color, texture, density, environmental adaptation, disease susceptibility, and other factors. There are 52 varieties plus 10 blends and 4 mixtures from an April, 1972, planting under test at this station. Plots measure 6 x 8 ft and each variety is replicated three times. Fertilizer is applied 4 times per year to supply a total of 4 pounds of nitrogen per 1,000 sq ft, using a 10-6-4 analysis fertilizer. Mowing is performed 2 or 3 times per week at 1.5 inches. The turf is irrigated as needed to prevent wilt. Ten of these varieties are also being observed at two satellite stations located in Glencoe (north) and Belleville (south), Illinois. A planting of over 60 new experimental selections was made on September 7, 1974, to expand our study of Kentucky bluegrass varieties. The basis for these efforts is that improvements in the characterictics and adaptation of a turfgrass reduce its dependency on cultural practices designed to compensate for its weaknesses. Thus, turfgrass management is made simpler and higher turfgrass quality is obtainable with the use of improved varieties.

The two diseases of principal importance this year were Helminthosporium leaf spot in spring and Fusarium blight in summer. Those varieties showing the least injury from these diseases include: A-20, A-34, Adelphi, Baron, EVB-282, EVB-391, Glade, K1-143, K1-155, K1-187, Majestic, Monopoly, P-59, P-140, Parade, PSU-150, PSU-190, RAM #1, RAM #2, Sydsport, Touchdown and Victa (Table 32). Some Sclerotinia dollar spot was observed in Nugget and Windsor, but it did not occur extensively in the plots.

Table 29. Effects of shredded sod rate and topdressing rate on the establishment of 'A-20' Kentucky bluegrass planted on July 6, 1972.

Shredded sod (bushels/1000 sq ft)	Topdressing soil (cu. yd/1000 sq ft)	No. of weeks after planting		
		20	58*	98*
		(estimated % cover by 'A-20')		
	0	10.7		
2	0.25	9.3	59.8	91.4
	0.5	10.7		
	0	30.0		
5	0.25	28.3	70.1	97.6
	0.5	30.7		
	0	41.0		
8	0.25	41.7	85.1	97.5
	0.5	42.7		
LSD .05		10.0	3.0	6.7

*As no significant differences were found among topdressing rates, estimates of % cover by 'A-20' were made only for shredded sod treatments during the 1973 and 1974 readings.

Table 30. Effect of several companion grasses on the spreading of 'A-20; Kentucky bluegrass planted from plugs on June 27, 1972.

Companion grass	Seeding rate (kg/are)	No. of weeks after planting 2	21	52	100
		estimated % cover of 'A-20'			
'Kenblue'-type Kentucky bluegrass	1.0	3	7	--	--
common perennial ryegrass	2.5	3	6	11	43
'Pennlawn' red fescue	2.0	3	6	25	28
control	---	3	78	78	70
LSD .05		-	2	7	12

Table 31. Effects of various herbicides on the control of annual bluegrass and the establishment of 'A-20' Kentucky bluegrass machine-planted with plugs and treated on May 22, 1973.

Treatment	Rate (kg/ha)	No. of weeks after planting							
		4	14	25	52	4	14	25	52
		estimated % cover							
		'A-20' Kentucky bluegrass				Annual bluegrass			
DCPA	13.4	5	24	38	40	6	14	42	40
bensulide	13.4	5	7	32	33	2	5	25	33
benefin	3.4	5	15	45	53	1	3	17	33
calcium arsenate	292 x 2+	5	14	43	80	20	21	13	6
oxadiazon	2.2	5	36	74	86	0	0	1	4
endothall-G*	4.5	5	8	23	12	--	33	60	82
endothall-S*	1.1	5	7	20	20	--	6	40	68
control	---	5	10	30	28	28	28	47	55
LSD .05		-	5	13	16	17	14	18	19

* Endothall formulations (G-granular and S-potassium salt solution) were applied to a mixed community of 'A-20' and annual bluegrass on July 17, July 27, August 16, 1973.

+ Calcium arsenate was applied a second time 14 weeks after planting.

Table 32. 1974 varietal evaluation results with Kentucky bluegrass varieties, blends and mixtures planted April, 1972.

Variety	Leaf Spot rating[1]	Fus. Blt. rating[2]	Quality Rating[3] 7/16/74	9/4/74	10/17/74
A-20	1.3	1.0	2.0	3.7	1.7
A-34	2.3	1.0	2.7	4.0	2.3
Adelphi (P-69)	2.3	1.0	2.3	2.3	2.7
Ba 61-91	2.3	2.7	2.3	3.3	3.0
Ba 62-55	2.7	3.0	2.3	3.3	3.0
Baron	2.3	1.0	2.7	3.7	3.3
Bonnieblue (P-106)	1.7	2.0	2.7	3.7	3.0
Brunswick (P-57)	2.3	2.3	3.0	3.7	1.7
Campina	6.0	1.0	2.3	3.3	2.7
Delft	3.0	5.7	3.0	6.0	4.0
EVB-282	2.7	1.0	2.0	3.7	3.0
EVB-305	2.0	4.3	3.0	5.3	4.3
EVB-307	1.7	2.0	2.7	4.3	2.7
EVB-391	2.0	1.0	3.0	3.3	2.7
Fylking	2.0	3.7	2.0	4.7	3.3
Galaxy (P-27)	1.3	3.0	2.3	3.3	2.7
Geronimo	1.7	3.7	2.7	4.7	3.0
Glade (P-29)	2.3	1.0	2.7	2.7	2.7
K1-131	1.7	2.0	3.0	2.7	3.0
K1-132	1.7	3.0	3.0	3.7	3.0
K1-133	2.0	2.0	2.3	3.3	3.0
K1-138	4.0	3.7	2.7	6.3	4.3
K1-143	2.0	1.0	2.3	3.0	3.0
K1-155	2.0	1.0	2.3	3.3	2.7
K1-157	4.3	4.0	2.0	4.3	2.7
K1-158	4.7	2.0	2.0	3.3	2.7
K1-187	2.0	1.0	2.7	3.0	3.0
Kenblue	5.7	1.7	2.7	5.0	3.7

Table 32. Continued

Variety	Leaf Spot rating[1]	Fus. Blt. rating[2]	Quality Rating[3] 7/16/74	9/4/74	10/17/74
IL-3817	1.7	2.7	2.0	4.3	3.0
Majestic (P-84)	1.7	1.0	2.0	3.0	3.0
Merion	1.3	1.3	2.0	3.7	3.0
MLM-18001	2.7	3.0	2.3	3.0	3.0
Monopoly	2.0	1.0	2.0	2.3	2.0
Nugget	1.3	1.7	2.7	4.7	3.3
P-59	2.0	1.0	2.7	3.0	2.3
P-140	2.0	1.0	1.3	3.0	1.7
Parade	2.0	1.0	2.3	3.0	2.7
Park	6.7	2.7	2.0	4.7	3.3
Pennstar	1.7	1.3	2.7	4.7	3.0
Plush (P-133)	2.3	3.3	2.3	3.3	2.3
PSU-150	1.7	1.0	1.7	2.7	2.7
PSU-169	1.3	2.7	2.0	3.7	2.3
PSU-190	1.7	1.0	2.3	3.0	3.0
PSU-197	2.3	3.7	2.3	6.3	3.3
RAM #1	2.3	1.0	2.7	3.3	2.7
RAM #2	1.7	1.0	2.7	3.0	2.3
Sodco	2.7	2.0	2.0	3.7	3.0
Sydsport	2.3	1.0	2.3	3.0	2.7
Touchdown (P-142)	2.0	1.0	3.0	2.0	2.3
Vantage (Ba61-24)	4.3	1.3	2.3	3.7	2.7
Victa (Ba62-54)	2.0	1.0	2.7	3.7	3.0
Windsor	3.7	1.0	2.3	3.0	2.3
BLENDS					
Merion + Kenblue	3.0	2.7	2.3	4.7	3.0
Merion + Pennstar	1.7	2.0	2.0	4.3	3.0
Merion + Baron	2.0	1.7	2.0	3.7	3.0
Nugget + Pennstar	1.7	1.3	2.7	4.0	2.7
Nugget + Park	3.3	2.0	2.3	4.7	3.0
Nugget + Glade	1.7	1.0	2.7	3.0	2.7

Table 32. continued

Variety	Leaf Spot rating[1]	Fus. Blt. rating[2]	Quality Rating[3] 7/16/74	9/4/74	10/17/74
Nugget + Adelphi	1.3	1.7	2.3	3.7	3.0
Victa + Vantage	1.7	1.3	2.0	3.7	2.3
P-59 + Brunswick	1.3	2.3	2.0	4.7	1.7
Blend 38	2.3	1.7	2.7	3.7	2.7
		MIXTURES			
Fylking + Jamestown (RF)	1.7	3.7	2.7	6.7	3.0
Fylking + Pennlawn (RF)	2.3	3.7	2.3	6.0	3.0
Fylking + C-26 (HF)	2.0	2.7	2.7	5.3	3.0
Fylking + Pennfine (PR)	1.3	1.0	2.0	2.7	3.0

[1]Leaf spot ratings were made on May 4, 1974, using a scale of 1 through 9 with 1 representing no disease; 2 and 3 indicate some thinning of the turf; 4 to 6 indicates some blighting while 7 to 9 indicates severe blighting of the turf.

[2]Fusarium blight ratings were made on August 31, 1974, using a scale of 1 through 9 with 1 representing no disease and 9 representing complete blighting.

[3]Visual quality was measured using a scale of 1 through 9 with 1 representing best quality and 9 representing poorest quality.

The blends showed characteristics of both varietal components in most cases. For example, the Nugget-Park blend showed some leaf spot thinning while Nugget was essentially unaffected and Park was seriously thinned. The same compromise in leaf spot incidence was evident in the Merion-Kenblue blend. The summer quality data also illustrated this averaging effect from blending. Exceptions included the Nugget-Glade blend, in which Glade appears dominent, and the Brunswick-P-59 blend in which Brunswick appears dominent. These results suggest that blends should be constructed using component varieties that are compatible in color and vigor, and that possess outstanding qualities or, at least, no serious deficiencies such as Helminthosporium leaf spot or Fusarium blight susceptibility; or use blends in which the low-quality components (fillers) disappear due to the greater vigor of the high-quality components.

The Kentucky bluegrass-fine fescue mixtures have not been good turfs because of high disease incidence and the loss of visual quality during summer. However, the Kentucky bluegrass-perennial ryegrass (Fylking-Pennfine) has been outstanding and appears to be predominently ryegrass after two and one-half years.

G. 3. b. Fine-leaf Fescue Variety Evaluation. A. J. Turgeon.

Fine-leaf fescues (creeping red, Chewings, hard, and sheep) have traditionally found use as shade grasses or for drouthy, sandy sites. In the past, their performance is sunny locations or fine-textured Illinois soils has generally been less than satisfactory. Helminthosporium leaf spot, Sclerotinia dollar spot and Fusarium blight have been associated with the deterioration of these grasses in summer.

The fine-leaf fescue varieties were planted in April, 1972. Plots measure 6 x 8 ft. and each is replicated three times. Fertilizer is applied twice yearly to supply a total of 2 pounds of nitrogen per 1,000 sq ft.

The best varieties this year were C-26, Scaldis, Koket and Jade (formerly Horritine) (Table 33).

G. 3. c. Creeping Bentgrass Variety Evaluation. A. J. Turgeon.

Eighteen varieties and selections of creeping bentgrass were planted in 1973 and are now well established as putting green turfs. The principal observation to date has been the dramatic deterioration of 'Toronto' (C-15) due to red leaf spot (Helminthosporium erythrospyllum) disease. Fungicide applications will be withheld during early 1975 in order to determine relative susceptibility of these varieties to various diseases.

G. 3. d. Perennial Ryegrass Variety Evaluation. A. J. Turgeon.

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

Table 33. Turfgrass quality of fine-leaf fescues planted April, 1972.

Variety	Quality Rating[1]		Variety	Quality Rating[1]	
	8/14/74	10/17/74		8/14/74	10/17/74
1. Barfalla	5.3	3.3	15. Polar	5.7	4.7
2. Barok	5.7	5.3	16. Roda	7.0	7.0
3. Dawson	7.3	7.0	17. Scaldis	4.7	3.0
4. Durlawn	5.7	5.7	18. Scarlet	5.7	4.3
5. Encota	5.3	5.3	19. Waldorf	5.7	4.0
6. Flavo	5.7	5.0	20. C-26	4.7	3.0
7. Highlight	7.7	7.0	21. Cebeco 570-2	7.0	7.3
8. Jade	4.7	2.7	22. Cebeco Hz 71-4	7.0	7.0
9. Jamestown	5.7	5.0	23. ERG-11	7.0	6.7
10. Koket	4.7	3.3	24. F-84	5.7	3.7
11. Menuet	5.7	3.7	25. HF-11	6.7	5.7
12. Novarubra	6.3	5.3	26. Ru-45 C	6.0	4.3
13. Oregon-K	5.3	4.0	27. C-26 + Jamestown	6.0	4.7
14. Pennlawn	5.0	4.3			

[1]Quality ratings were made on a scale 1 through 9 with 1 representing best quality and 9 representing poorest quality.

Pennfine was the outstanding variety through 1974; however, all varieties except common appeared good to excellent in October as very little rust disease was observed (Table 34).

H. New Publications and Slide Sets Available. A. J. Turgeon.

Two new extension circulars will be available early in 1975; they include: "1975 Turfgrass Pest Control" which provides up-to-date recommendations of herbicides, fungicides and insecticides, and "Turfgrasses of Illinois" which is a guide to the characteristics and identification features of fourteen turfgrass species found in Illinois. These are available from Agricultural Publications, Mumford Hall, University of Illinois, Urbana, Illinois 61801.

A new slide set entitled "Identifying Illinois Turfgrasses" has 64 slides containing detailed sketches, and photographs showing important vegetative structural features that are useful in distinguishing among fourteen turfgrass species. A study guide accompanies the slide set. Cost is $10.25 for the slides or $4.95 for the film strip. These are available from Vocational Agriculture Service, Mumford Hall.

Table 34. Turfgrass quality of perennial ryegrasses planted August, 1972.

Variety	Quality Ratings[1]		
	6/26/74	8/14/74	10/17/74
1. Pelo	4.7	4.7	2.7
2. NK-100	4.0	4.0	3.0
3. NK-101	4.7	5.3	2.7
4. NK-200	3.0	4.0	3.0
5. Manhattan	3.7	3.3	2.7
6. Pennfine	2.0	2.3	2.0
7. Common	5.7	6.7	4.7
8. K8-137	3.7	3.3	2.7
9. K8-142	3.7	5.0	3.7

[1]Quality ratings were made on a scale of 1 through 9 with 1 representing best quality and 9 representing poorest quality.