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This publication includes lecture notes of papers presented at the 2001 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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PERFORMANCE OF BENTGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

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Bentgrass species used for specialized, high maintenance, close-cut turf include creeping bentgrass (*Agrostis palustris*, also known as *A. stolonifera*), colonial bentgrass (*A. tenuis* or *A. capillaris*), highland or dryland bentgrass (*A. castellana*), and velvet bentgrass (*A. canina*). Creeping and velvet bentgrasses have a dense, prostrate growth habit and are able to persist under very low mowing heights. Creeping bentgrasses are more popular for use on putting greens because of their vigorous, stoloniferous growth habit and are also well adapted for golf course use in both the cool temperate and warm, humid environments of the United States. In 1954, H.B. Musser released Penncross, the first seeded variety of creeping bentgrass (Musser, 1959). Since that time, breeding efforts have gradually improved creeping bentgrass varieties to withstand the increasing demands of the game of golf. Turf managers may benefit from recent releases of improved creeping bentgrass varieties with better turf quality, higher shoot density, improved traffic, and greater disease and stress tolerance than older varieties.

Colonial bentgrass, also referred to as browntop, has traditionally been used as a lawn grass in areas of northern Europe and New Zealand that have cool, humid, and mild summers. Colonial bentgrasses are fine-textured grasses that have a more upright and less aggressively spreading growth habit than creeping bentgrasses. Compared to creeping bentgrasses, colonial bentgrasses typically have a brighter green color and better color retention during cool weather. In general, they also have better wear tolerance and resistance to dollar spot (caused by *Sclerotinia homoeocarpa*), but are more susceptible to brown patch (caused by *Rhizoctonia solani*). Colonial bentgrasses perform best in New Jersey when mowed between 3/8 and 3/4 of an inch, and thus are better adapted for fairway or tee use.

Velvet bentgrass forms the finest-textured and most dense turf of the bentgrasses and can nearly resemble green velvet when managed properly. It spreads mainly through profuse production of erect tillers with short, limited stolons. This grass can tolerate very close mowing, heat, cold, and shade, and is one of the most drought resistant of the bentgrasses used for turf (Skogley, 1973). Velvet bentgrass can form excessive thatch, especially at higher fertility rates and cutting heights. It is also susceptible to the diseases red thread and copper spot. Velvet bentgrass has not been used extensively for high maintenance turf, largely because its range of adaptation has not been well recognized. Selections of velvet bentgrass have persisted for many years in trials under New Jersey growing conditions.

Other bentgrasses currently under evaluation for turf include dryland bentgrass and Idaho bentgrass (*A. idahoensis*). Dryland bentgrass is similar in adaptation and appearance to colonial bentgrass, but is more blue-green in color and has deeper more extensive rhizomes. Idaho bentgrass is native to the western United States and is adapted to wet meadows or bogs in mountainous regions. This grass establishes well in turfgrass plots, but has a dull green color and an upright growth habit that is less attractive than the creeping, colonial, or velvet bentgrasses. Idaho bentgrass has exhibited good resistance to dollar spot in New Jersey turf trials.

The New Jersey Agricultural Experiment Station participates in the National Turfgrass Evaluation Program (NTEP), which evaluates many species of turfgrass, including bentgrasses, throughout the United

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States. The Rutgers turfgrass breeding program conducts extensive field evaluations of collections and new material developed in the improvement program, as well as cultivars and selections developed in other breeding programs.

PROCEDURES

Bentgrass evaluation trials were established in September 1998 (Tables 1 and 2), November 1998 (Tables 3 and 4), September 1999 (Tables 5 to 7), and September 2000 (Tables 8 and 9) at North Brunswick, NJ. Two trials planted in 1998 (Tables 3 and 4) included all entries of the 1998 National Bentgrass Test coordinated by the National Turfgrass Evaluation Program. The trials seeded in 1998, 1999, and 2000 included named cultivars and experimental selections developed by the New Jersey Agricultural Experiment Station and other breeding programs. The 1999 and 2000 greens tests (Tables 5, 6, and 8) simulated putting green conditions on a modified Nixon loam. The 1998 greens trials were established on a sand-based root zone constructed to USGA guidelines (United States Golf Association, 1993) (Tables 1 and 3). The four other tests (Tables 2, 4, 7, and 9) simulated fairway conditions on a Nixon loam.

All sites were well drained and openly exposed to both sunlight and air circulation. Plot size was 3 X 5 ft for all trials, except the 1998 NTEP trials (greens and fairway/tee) which were 4 X 8 ft (Tables 3 and 4). Plots were hand-seeded at a rate of approximately 0.5 lb/1000 ft^2. All tests were arranged in a randomized complete block design with three replications.

The annual rate of nitrogen applied and mowing height for each test are presented in Table 10. The putting green tests were mowed five to six times per week during periods of active growth with a triplex or walk-behind reel mower equipped to collect clippings. The fairway tests were mowed and clippings were removed three times per week with a triplex reel mower during periods of active growth. Soil pH was maintained in the range of 6.0 to 6.5 with agricultural limestone. All tests were irrigated to avoid drought stress.

Plots in the 1998 NTEP trials (green and fairway/tee) (Tables 3 and 4) were split. The front 5/8ths of the plots received a preventive disease control program in 2001; the rear 3/8ths of the plots were not sprayed preventively for disease. The spray schedules for the 1998 greens and fairway trials are outlined in Table 11. Applications denoted as 'entire' were applied to the 1998 NTEP trials (Tables 3 and 4) as well as the 1998 putting green trial not sponsored by NTEP (Table 1).

The 1999 and 2000 greens and fairway trials (Tables 5 to 9) received an application of fungicide (Chipco 26GT at 3 oz/1000 ft^2 and Bayleton 50DG at 0.73 oz/1000 ft^2) in July 2001 for dollar spot and brown patch control, two insecticide applications (Dursban Pro at 2.0 oz/1000 ft^2 and Merit 75 WP at 0.2 oz/1000 ft^2) in July for cutworm control, and another fungicide application (Daconil Ultrex at 10 lb/acre) in fall for dollar spot control.

Plots were evaluated frequently during the growing season for overall turf quality (i.e., turf density, texture, uniformity, color, growth habit, and amount of disease and insect damage). Turf quality, spring green-up, color, density, and disease were rated on a 1 to 9 scale where 9 represented the most desirable turf characteristic. All data were subjected to analysis of variance. Means were separated using the least significant difference (LSD) means separation test.

RESULTS AND DISCUSSION

Turf Quality Evaluations

Entries in Tables 1 through 7 are ranked according to their overall multi-year quality average. Entries in Tables 8 and 9 are ranked according to their turf quality average in 2001. The best performing cultivars in the 1998 greens trial (Table 1) were two velvet bentgrasses (SR 7200 and Greenwich) and two creeping bentgrasses (Penn G-2 and Penn G-6). These newer cultivars performed better than a number of older established varieties such as Penncross, Crenshaw, and 18th Green, among others. Peterson's creeping bluegrass had poor turf quality in this trial. In the 1998 fairway trial (Table 2), one experimental colonial bentgrass (Syn 9BNC) performed significantly better than most other experimental selections as well as the cultivar SR 7100.

In the 1998 NTEP putting green trial (Table 3), two velvet bentgrasses (SR 7200 and Vesper) ranked with the top performing creeping bentgrasses (Penn A-1, Penn G-1, PST-A2E, Syn 96-3, Penn A-4, Penn G-6, and L-93). All of the top performing cultivars surpassed older standard varieties such as Penncross, Pennlinks, Crenshaw, and Providence. A European velvet bentgrass, Bavaria, performed poorly in this and other tests in which it was included. In the 1998 NTEP fairway/tee trial (Table 4), two ex-

perimental colonials topped the list of sprayed turf plots (ISI At-5 and SRX 7MODD). L-93 was the top performing creeping bentgrass.

In the 1999 greens trial (Table 5), the Penn series and L-93 remained among the top performers along with the experimental selection EMCB comp. In the velvet greens trial (Table 6), there was little significant difference between the highest and lowest performers. In the 1999 fairway trial (Table 7), two experimental velvet bentgrass selections (EFD Comp and EVD comp) as well as two experimental creeping bentgrasses (SYN OPN and SYN OE) had the best turf quality compared to other cultivars and selections.

Top performing selections in both the 2000 putting green (Table 8) and fairway (Table 9) trials were C953, C954, and C952 creeping bentgrasses and CIS AC-1 velvet bentgrass. SR 7200 velvet bentgrass and Penn A-4 creeping bentgrass also performed well in both trials. The experimental selections RTE comp and WPE comp performed well in the putting green trial.

Dollar Spot

Although effectively controlled with fungicides, dollar spot is an economically important disease of golf course turf. Compared to creeping bentgrass, velvet and colonial bentgrasses have better resistance to dollar spot, although if left untreated, these bentgrasses can be severely damaged under high disease pressure. Within the creeping bentgrasses, L-93 and Penn A-1 have consistently exhibited moderate to good disease resistance (Tables 1, 3, 5, and 7 to 9), whereas Crenshaw, Century, and others (Tables 1, 3, 5, and 7) are highly susceptible to the disease. Highly susceptible creeping bentgrasses suffered damage from dollar spot even when managed under a preventive disease control program (Table 3).

Brown Patch

Velvet bentgrass cultivars and selections displayed good resistance to brown patch in most trials (Tables 5 and 9). Colonial bentgrass was more susceptible to brown patch than either creeping or velvet bentgrass (Tables 5, 7, and 9); however, with a preventive spray program, brown patch was controlled reasonably well in colonial bentgrass (Table 4). Depending on disease pressure, creeping bentgrasses exhibited a wide disparity in brown patch resistance (Tables 5 and 7).

Spring Green-up and Winter Color

Many of the colonial bentgrasses, Idaho bentgrass, and most velvet bentgrasses, except Bavaria, had better spring green-up than most creeping bentgrasses (Tables 3 and 4). Creeping bentgrass cultivars and selections exhibit wide variation in spring green-up and color retention during late fall and winter months (Tables 3, 4, and 9). Retaining green color during winter months is an important attribute in areas where golf is played during winter months. Green color retention during winter also indicates more active growth and cultivars with better color retention may compete better against *Poa annua*, which is actively growing during that time.

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Table 1. Performance of bentgrass cultivars and selections in a putting green trial seeded in September 1998 at North Brunswick, NJ. (Sand-based root zone.)

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Spring Green-up[2] April 2001	Dollar Spot[3] June 2001
1	SR-7200	velvet	6.3	6.5	6.9	5.5	7.0	7.7
2	Penn G-2	creeping	5.9	6.3	5.8	5.6	5.3	5.7
3	Greenwich	velvet	5.8	5.6	6.2	5.6	7.0	6.7
4	Penn G-6	creeping	5.6	5.9	5.7	5.3	5.7	6.0
5	Vesper	velvet	5.1	5.1	5.2	5.0	7.3	6.0
6	SRX 1HS	creeping	4.9	4.8	5.2	4.6	5.7	7.7
7	7001	velvet	4.7	3.7	5.1	5.1	6.3	6.7
8	L-93	creeping	4.7	4.7	5.2	4.1	4.7	7.3
9	SRX 1HP	colonial	4.7	4.7	5.1	4.2	4.3	6.0
10	Penn A-4	creeping	4.6	4.9	5.1	4.0	5.3	6.3
11	Pick CB 13-94	creeping	4.5	4.3	5.0	4.3	6.0	5.3
12	Southshore	creeping	4.5	4.4	4.7	4.5	5.0	5.7
13	SRX IC4	colonial	4.4	4.4	4.5	4.3	5.3	4.3
14	SRX 1HB	colonial	4.4	4.5	4.3	4.5	4.3	5.7
15	SRX 102J	creeping	4.4	4.3	4.9	3.9	5.0	5.3
16	Pick CB 2-94	creeping	4.3	4.9	4.1	3.9	5.0	5.0
17	ODA	creeping	4.2	4.9	4.1	3.7	4.0	6.0
18	Pick CB E-97	creeping	4.2	4.3	4.1	4.3	5.0	6.0
19	MS2	creeping	4.2	4.6	4.3	3.7	4.0	5.3
20	MS4	creeping	4.1	4.0	4.4	4.1	4.3	6.3
21	Pick CB 1-94	creeping	4.1	3.5	4.7	4.0	5.3	6.0
22	Providence	creeping	4.1	3.8	4.4	4.0	3.7	6.3
23	Pick CB F-97	creeping	4.0	3.8	4.6	3.7	5.3	7.3
24	ES6	creeping	3.9	4.0	4.1	3.5	4.7	7.7
25	Putter	creeping	3.8	3.9	4.1	3.5	4.0	5.3
26	Pick CB 3-94	creeping	3.8	4.0	3.6	3.6	4.3	4.0
27	MS7	creeping	3.7	4.1	4.1	2.9	4.3	8.0
28	Cobra	creeping	3.7	3.8	4.1	3.1	4.0	6.7
29	Cato	creeping	3.6	3.5	4.0	3.5	4.3	8.0
30	Mariner	creeping	3.5	3.2	3.9	3.5	4.3	7.3
31	Pick CB 16-94	creeping	3.5	3.1	3.7	3.7	4.3	7.0
32	Century	creeping	3.5	4.0	3.3	3.1	4.3	2.7
33	Crenshaw	creeping	3.4	3.7	3.2	3.4	3.7	3.0
34	Penncross	creeping	3.4	3.4	3.5	3.3	4.3	8.0
35	18th Green	creeping	3.4	3.9	3.3	2.9	4.0	3.3

Table 1 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Spring Green-up[2] April 2001	Dollar Spot[3] June 2001
36	MS5	creeping	3.3	3.7	3.1	3.1	4.7	7.3
37	ES1	creeping	3.1	3.8	2.8	2.8	3.7	6.0
38	AT-1	colonial	2.3	1.5	2.5	2.8	4.7	7.0
39	Bavaria	velvet	2.0	2.7	1.9	1.4	3.3	8.7
40	Peterson Crp. Blue	poa	1.3	1.3	1.4	1.1	4.0	4.0
	LSD at 5% =		0.6	0.8	0.8	0.9	1.4	1.9

[1]9 = best turf quality
[2]9 = earliest spring green-up
[3]9 = least dollar spot disease

Table 2. Performance of bentgrass cultivars and selections in a fairway/tee trial seeded in September 1998 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] Aug. 2001	Dollar Spot[2] Sept. 2001
1	Syn 9BNC	colonial	5.7	6.1	5.2	5.9	7.7	9.0
2	Syn 9F7	colonial	5.2	5.5	4.8	5.3	7.0	9.0
3	LRF-98-493	colonial	4.9	5.0	4.8	5.1	7.0	9.0
4	Syn 98Y	colonial	4.9	5.0	4.6	5.1	8.3	9.0
5	SR 7100	colonial	4.8	5.5	4.1	4.8	7.7	9.0
6	Syn 9DH	colonial	4.8	5.2	4.4	4.6	8.3	9.0
7	SRX IC4	creeping	4.8	5.4	3.7	5.3	9.0	5.3
8	9596	creeping?	4.7	5.6	4.4	4.2	7.3	8.7
9	Mom At 103	colonial	4.7	5.9	3.9	4.3	6.0	9.0
10	Mom At 106	colonial	4.2	5.0	4.0	3.8	4.0	9.0
11	AT-1	colonial	3.3	3.0	3.3	3.6	9.0	7.3
	LSD at 5% =		0.6	0.6	0.8	0.9	1.9	1.5

[1]9 = best turf quality
[2]9 = least disease

Table 3. Performance of bentgrass cultivars and selections in the 1998 National Bentgrass Putting Green Trial (NTEP) seeded in November 1998 at North Brunswick, NJ. (Sand-based root zone.)

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Spring Green-up[2] April 2001	Dollar Spot[3] Spray June 2001	Dollar Spot[3] No Spray 2001 Avg.	Leaf Texture[4] Sept. 2001	Density[5] Sept. 2001	Color[6] Sept. 2001
1	SR 7200	velvet	7.0	7.1	6.6	7.3	8.7	8.3	7.8	9.0	7.7	6.7
2	Penn A-1	creeping	6.9	7.0	7.1	6.7	4.7	8.3	7.5	7.3	7.7	8.0
3	Vesper	velvet	6.5	6.5	6.3	6.7	6.0	6.0	6.4	9.0	6.3	6.7
4	Penn G-1	creeping	6.5	6.3	6.5	6.6	5.3	5.7	5.1	7.7	6.7	7.7
5	PST-A2E	creeping	6.1	5.8	6.5	6.1	3.7	8.7	7.5	7.3	6.0	7.0
6	Syn 96-3	creeping	6.1	6.4	6.0	6.0	3.3	5.7	4.6	7.3	7.3	7.3
7	Penn G-6	creeping	6.1	5.6	6.1	6.5	6.7	7.3	6.7	6.0	7.0	7.3
8	Penn A-4	creeping	6.0	5.5	6.6	5.9	4.0	8.0	6.8	6.3	6.0	6.0
9	L-93	creeping	5.9	4.8	6.3	6.6	5.3	8.7	8.0	6.0	5.3	6.7
10	Syn 96-1	creeping	5.9	6.1	5.9	5.6	3.7	5.7	4.8	6.3	6.7	5.7
11	ABT-CRB-1	creeping	5.9	5.9	6.1	5.6	1.3	7.0	6.6	6.0	6.3	7.0
12	Penn A-2	creeping	5.8	5.6	6.1	5.8	4.0	9.0	7.8	6.0	5.3	6.7
13	Syn 96-2	creeping	5.8	6.1	5.7	5.6	2.3	4.7	4.4	6.7	6.3	6.7
14	SRX 1NJH	creeping	5.6	5.3	5.9	5.6	5.3	8.0	6.1	6.0	6.0	6.0
15	SR 1119	creeping	5.6	5.3	5.4	6.0	4.7	6.7	5.2	5.7	5.7	7.0
16	Bengal	creeping	5.6	5.3	5.4	6.0	5.3	6.7	5.6	6.7	5.7	7.3
17	Imperial	creeping	5.4	5.0	5.2	5.9	3.7	5.7	5.6	6.3	5.0	6.0
18	ISI AP-5	creeping	5.4	5.1	5.3	5.6	4.3	8.3	7.4	6.0	6.0	6.3
19	Century	creeping	5.3	5.1	5.0	5.7	4.3	4.3	3.4	6.3	5.3	6.3
20	Backspin	creeping	5.2	4.8	5.4	5.4	4.7	4.7	5.0	5.3	5.3	5.0
21	Brighton	creeping	5.1	4.6	5.3	5.5	5.7	6.0	5.5	5.3	4.7	6.3
22	Crenshaw	creeping	5.0	4.8	5.2	5.0	3.7	5.0	3.9	5.3	5.0	7.3
23	BAR CB 8US3	creeping	5.0	4.4	5.0	5.5	5.0	5.0	5.1	5.7	6.7	7.3
24	Providence	creeping	5.0	4.4	5.1	5.4	4.0	6.7	5.3	5.0	4.7	5.7
25	7001	velvet	5.0	3.7	5.5	5.7	3.7	5.7	7.0	9.0	5.3	5.0

Table 3 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Spring Green-up[2] April 2001	Dollar Spot[3] Spray June 2001	Dollar Spot[3] No Spray 2001 Avg.	Leaf Texture[4] Sept. 2001	Density[5] Sept. 2001	Color[6] Sept. 2001
26	SRX 1BPAA	creeping	4.8	4.5	4.8	5.0	6.3	6.3	6.0	4.3	4.0	5.3
27	Pick CB 13-94	creeping	4.7	4.4	4.5	5.0	6.3	7.0	6.1	4.7	4.3	6.0
28	Pennlinks	creeping	3.6	3.4	3.1	4.4	6.7	8.0	7.3	3.7	3.0	4.7
29	Penncross	creeping	3.6	3.7	3.2	4.0	7.7	8.3	7.4	4.0	3.3	4.0
30	Bavaria	velvet	2.6	3.6	2.2	2.0	1.7	8.7	8.2	7.3	1.0	3.0
	LSD at 5% =		0.6	0.9	0.8	0.7	1.3	1.6	1.6	1.6	1.8	2.5

[1]9 = best turf quality
[2]9 = earliest spring green-up
[3]9 = least disease
[4]9 = finest leaf texture
[5]9 = densest turf
[6]9 = darkest green color

Table 4. Performance of bentgrass cultivars and selections in the 1998 National Bentgrass Fairway/Tee Evaluation Trial (NTEP) seeded in November 1998 at North Brunswick, NJ.

			Turf Quality[1]					Brown Patch[3]					
	Cultivar or Selection	Species	1999-2001 Avg.	1999 Avg.	2000 Avg.	2001 Avg.	Spring Green-up[2] April 2001	No Spray 2001 Avg.	Spray Aug. 2001	No Spray Aug. 2001	Color[4] Aug. 2001	Density[5] Aug. 2001	Leaf Texture[6] Aug. 2001
1	ISI At-5	colonial	6.5	6.8	6.5	6.2	5.3	5.2	9.0	7.7	3.7	5.3	6.0
2	SRX 7MODD	colonial	6.3	6.4	6.6	6.0	6.3	5.2	9.0	6.3	5.0	5.3	6.3
3	L-93	creeping	6.3	6.1	6.5	6.2	3.7	5.7	9.0	9.0	5.3	6.0	6.3
4	SRX 7MOBB	colonial	6.0	6.3	5.8	5.8	6.3	3.3	9.0	3.7	4.0	5.0	5.7
5	ABT-COL-2	colonial	5.9	5.8	5.6	6.2	5.3	3.8	8.3	4.7	3.3	5.7	6.3
6	PST-OVN	creeping	5.7	6.4	5.8	4.9	3.0	4.2	9.0	9.0	6.3	5.0	5.3
7	Penn G-6	creeping	5.6	5.7	5.6	5.5	5.3	4.7	9.0	9.0	5.3	4.7	5.3
8	Glory	colonial	5.6	5.6	5.4	5.7	7.3	4.7	8.7	5.3	3.3	4.7	5.3
9	SRX 1BPAA	creeping	5.5	5.6	5.4	5.4	4.3	4.7	9.0	9.0	7.3	6.3	5.0
10	Grand Prix	creeping	5.4	6.0	4.5	5.6	3.3	3.7	9.0	9.0	5.7	5.3	5.7
11	Brighton	creeping	5.3	5.5	4.8	5.5	5.0	4.2	9.0	9.0	6.3	5.7	5.3
12	Tiger	colonial	5.2	5.1	5.5	5.1	2.7	2.7	8.3	4.0	2.7	4.7	5.3
13	Imperial	creeping	5.2	5.6	4.6	5.3	4.7	4.7	9.0	9.0	4.7	6.0	6.3
14	Trueline	creeping	5.2	6.0	4.8	4.7	4.3	3.0	9.0	9.0	6.0	4.3	4.7
15	SR 7100	colonial	5.1	5.1	5.4	4.9	5.3	4.3	8.7	6.7	2.0	5.0	5.7
16	SR 1119	creeping	5.0	5.3	4.4	5.3	6.0	4.3	9.0	9.0	6.3	5.7	5.7
17	Seaside II	creeping	5.0	5.1	5.1	4.7	3.0	4.7	9.0	9.0	5.3	5.0	4.3
18	PST-9PM	colonial	4.9	5.2	4.9	4.7	5.7	3.3	9.0	9.0	2.7	4.0	5.0
19	Princeville	creeping	4.8	4.7	4.8	4.8	5.0	3.3	9.0	9.0	3.3	3.3	4.0
20	Backspin	creeping	4.7	5.2	3.8	5.1	3.7	4.2	9.0	9.0	4.0	4.7	5.3

Table 4 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Spring Green-up[2] April 2001	Brown Patch[3] No Spray 2001 Avg.	Brown Patch[3] Spray Aug. 2001	Brown Patch[3] No Spray Aug. 2001	Color[4] Aug. 2001	Density[5] Aug. 2001	Leaf Texture[6] Aug. 2001
21	Century	creeping	4.6	5.6	3.5	4.7	3.7	3.3	9.0	9.0	4.7	4.3	4.7
22	Providence	creeping	4.5	4.7	4.3	4.5	2.7	2.8	9.0	9.0	5.0	4.7	4.7
23	Golf Star	Idaho	4.5	4.5	4.7	4.2	7.0	3.2	9.0	7.7	2.3	3.0	4.3
24	Penncross	creeping	4.2	5.2	3.6	3.8	3.3	3.0	9.0	9.0	4.0	2.7	2.7
25	Penneagle	creeping	3.9	3.9	4.2	3.6	3.3	3.0	9.0	9.0	3.7	3.0	4.0
26	Seaside	creeping	2.5	2.5	2.2	2.6	8.0	2.2	9.0	9.0	2.7	1.7	2.0
	LSD at 5% =		0.6	0.7	0.8	0.9	1.8	1.3	0.4	1.6	1.4	1.9	1.4

[1]9 = best turf quality
[2]9 = earliest spring green-up
[3]9 = least disease
[4]9 = darkest green color
[5]9 = densest turf
[6]9 = finest leaf texture

Table 5. Performance of bentgrass cultivars and selections in a putting green trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] 2001 Avg.	Dollar Spot[2] 2001 Avg.
1	Penn A-1	creeping	5.1	5.3	5.0	4.5	7.5
2	EMCB comp	creeping	5.1	5.1	5.0	6.2	5.7
3	Penn G-1	creeping	5.0	5.0	4.9	5.7	7.0
4	EFD comp	velvet	5.0	5.3	4.7	9.0	8.2
5	L-93	creeping	4.9	5.0	4.8	6.7	7.0
6	Pick 96-2	creeping	4.9	4.9	4.9	7.2	4.8
7	Penn A-4	creeping	4.8	4.9	4.7	5.2	5.5
8	MCB comp	creeping	4.8	4.7	4.8	6.3	6.2
9	Koos Bent	creeping	4.6	4.5	4.8	6.7	6.3
10	MCI comp	velvet	4.6	4.7	4.5	8.5	7.8
11	EVD comp	velvet	4.5	4.6	4.4	8.3	7.2
12	EEC comp	velvet	4.4	4.8	4.0	8.7	8.0
13	Penneagle	creeping	4.4	4.4	4.4	6.2	7.5
14	Syn OFT	creeping	4.3	4.3	4.4	4.7	6.5
15	Pennlinks	creeping	4.3	4.2	4.3	5.8	6.7
16	VBC comp	velvet	4.2	4.3	4.1	9.0	7.5
17	Vesper	velvet	4.2	4.7	3.7	6.8	6.0
18	Southshore	creeping	4.2	4.3	4.1	6.3	6.8
19	SR 7200	velvet	4.2	4.5	3.9	8.7	7.2
20	Crenshaw	creeping	4.0	4.1	4.0	6.5	5.5
21	Putter	creeping	4.0	4.1	4.0	6.5	7.8
22	Syn OBT	creeping	4.0	4.1	3.9	6.3	7.3
23	Penn G-6	creeping	4.0	3.9	4.1	4.7	7.3
24	Matt's Bent	creeping	4.0	4.1	3.9	7.0	5.8
25	Heriot	colonial	3.7	4.2	3.2	4.2	8.7
26	BariFera	creeping	3.6	4.0	3.1	6.7	8.2
27	Regent	creeping	3.5	3.6	3.4	5.5	7.5
28	Bardot	colonial	3.4	3.9	3.0	3.3	9.0
29	Penncross	creeping	3.0	3.4	2.6	8.5	8.3
	LSD at 5% =		0.7	0.8	0.9	1.6	1.6

[1]9 = best turf quality
[2]9 = least disease

Table 6. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Dollar Spot[2] Sept. 2001
1	EFD Comp	velvet	5.6	5.5	5.7	7.3
2	Greenwich	velvet	5.4	5.5	5.3	6.3
3	MDD Comp	velvet	5.2	5.1	5.4	5.0
4	MCI Comp	velvet	5.1	5.1	5.2	7.7
5	SR 7200	velvet	5.0	5.2	4.8	7.3
6	Vesper	velvet	4.9	5.4	4.2	3.7
7	EVD Comp	velvet	4.8	4.7	4.9	7.7
8	EEC Comp	velvet	4.8	5.0	4.6	8.0
9	VBC Comp	velvet	4.6	4.7	4.6	6.0
	LSD at 5% =		0.6	NS	0.7	1.5

[1]9 = best turf quality
[2]9 = least disease

Table 7. Performance of bentgrass cultivars and selections in a fairway/tee trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] 2001 Avg.	Dollar Spot[2] 2001 Avg.
1	EFD Comp	velvet	6.7	6.6	6.8	7.3	8.6
2	EVD Comp	velvet	6.0	6.0	6.0	6.5	8.6
3	SYN OPN	creeping	5.9	6.2	5.5	7.3	5.4
4	SYN OE	creeping	5.9	6.6	5.3	7.2	5.5
5	Penn A-1	creeping	5.8	6.0	5.6	6.8	6.1
6	EMCB Comp	creeping	5.8	6.3	5.3	7.5	5.1
7	MCI Comp	velvet	5.8	5.5	6.0	7.5	8.8
8	VBC Comp	velvet	5.8	5.6	6.0	7.7	8.3
9	SR 7200	velvet	5.8	5.8	5.7	9.0	8.7
10	L-93	creeping	5.7	5.7	5.7	6.7	6.2
11	EEC Comp	creeping	5.7	5.7	5.6	8.3	8.7
12	A2E	creeping	5.7	5.7	5.7	7.0	6.4
13	SYN ODO	creeping	5.6	5.9	5.3	7.5	6.3
14	Penn A-4	creeping	5.5	5.8	5.2	6.7	5.2
15	Penn G-1	creeping	5.5	5.6	5.3	6.8	5.6
16	EF-115	creeping	5.5	6.2	4.7	6.0	5.8
17	SYN OBR	creeping	5.3	5.3	5.2	7.0	6.1
18	OVN	creeping	5.3	5.6	5.1	7.0	7.4
19	MCB Comp	creeping	5.2	5.8	4.7	6.7	3.8
20	SYN OMT	creeping	5.1	5.2	5.0	6.3	7.5
21	SYN OBR	creeping	5.1	5.4	4.8	7.5	5.1
22	Penneagle	creeping	5.0	5.2	4.7	7.8	5.1
23	Pennlinks	creeping	5.0	5.0	4.9	5.8	7.0
24	SYN OEH	creeping	5.0	5.4	4.6	7.0	4.6
25	Koos Bent	creeping	4.9	5.1	4.6	6.7	5.1
26	8151 Comp	creeping	4.8	5.1	4.5	7.8	4.4
27	SYN OFT	creeping	4.8	5.1	4.6	6.5	4.9
28	Southshore	creeping	4.7	4.9	4.5	6.8	5.6
29	SYN OBT	creeping	4.7	4.8	4.5	6.5	5.9
30	Penn G-6	creeping	4.6	4.7	4.5	6.8	5.8
31	Heriot	colonial	4.5	4.8	4.1	3.0	8.9
32	Putter	creeping	4.4	4.6	4.2	6.3	4.9
33	Cobra	creeping	4.3	4.1	4.4	6.7	5.0
34	Crenshaw	creeping	4.3	4.4	4.2	7.5	3.6
35	BariFera	creeping	4.2	4.5	3.9	4.7	6.2

Table 7 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] 2001 Avg.	Dollar Spot[2] 2001 Avg.
36	Bardot	colonial	4.1	4.1	4.0	2.7	8.8
37	Matts Bent	creeping	4.1	4.2	4.0	7.0	5.1
38	9F7	colonial	4.0	4.1	3.8	5.2	7.3
39	SYN 9DH	colonial	4.0	4.1	4.0	4.7	8.0
40	Regent	creeping	3.9	3.6	4.2	6.3	6.1
41	SYN 9SG	colonial	3.7	3.6	3.8	3.7	7.7
42	Penncross	creeping	3.3	3.3	3.3	7.5	5.9
43	Rasti	colonial	3.1	3.1	3.1	5.3	7.6
	LSD at 5% =		0.6	0.7	0.7	1.6	1.2

[1]9 = best turf quality
[2]9 = least disease

Table 8. Performance of bentgrass cultivars and selections in a putting green trial seeded in September 2000 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2001 Avg.	Establishment[2] Oct. 2000	Root Pythium[3] Nov. 2000	Dollar Spot[3] Sept. 2001
1	C953	creeping	6.6	4.7	8.7	7.0
2	C954	creeping	6.3	6.0	9.0	8.0
3	RTE comp	creeping	6.3	6.0	9.0	6.3
4	WPE comp	creeping	6.1	4.3	9.0	8.3
5	C952	creeping	6.0	5.7	8.7	7.7
6	EMC comp	creeping	5.9	5.7	9.0	7.7
7	CIS AC-1	velvet	5.9	6.7	5.0	9.0
8	CIS AC-1/AT-5	vel/col[4]	5.8	5.3	6.0	9.0
9	Penn A-4	creeping	5.4	6.7	7.3	5.3
10	SRX 1EWW1CR1	creeping	5.4	5.0	8.7	6.7
11	00-108	creeping	5.4	5.0	8.7	7.0
12	Penn G-2	creeping	5.3	5.7	8.7	7.7
13	SR 1119	creeping	5.3	9.0	8.3	6.7
14	Syn 96-2	creeping	5.3	6.7	8.3	4.7
15	MCB comp	creeping	5.3	5.7	8.7	5.3
16	SRX 1NJH	creeping	5.2	6.0	9.0	7.7
17	L-93	creeping	5.2	6.7	9.0	7.3
18	CIS AC-1/AP-5/AT-5	vel/col/cr[4]	5.2	6.3	7.3	8.3
19	SRX 1EWW1CR3	creeping	5.2	5.0	8.3	6.0
20	Brighton	creeping	5.1	6.7	8.0	7.3
21	SRX 1MOCR1	creeping	5.1	5.0	8.3	6.0
22	Cato	creeping	5.1	6.7	7.3	8.0
23	SRX 1EWW1CR2	creeping	5.1	4.3	8.7	6.0
24	SRX 1COCR	creeping	5.0	5.3	8.7	6.0
25	SRX 1DIN	creeping	5.0	5.7	8.3	7.3
26	CIS AP-7	creeping	5.0	5.7	8.7	5.7
27	CIS AC-1/AP-5	vel/cr[4]	4.9	5.3	7.3	9.0
28	SRX 1EW46-12	creeping	4.9	5.3	8.7	6.0
29	CIS AP-5	creeping	4.8	6.3	8.3	6.7
30	SRX 1EWW1CR4	creeping	4.8	5.3	9.0	6.7
31	Pick ECB	creeping	4.8	5.7	8.3	6.7
32	Syn-AIU	creeping	4.8	2.7	8.0	6.7
33	Century	creeping	4.6	2.3	8.7	8.0
34	Southshore	creeping	4.6	5.7	9.0	6.7
35	SRX 1BPAA	creeping	4.6	5.7	8.7	6.0

Table 8 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 2001 Avg.	Establishment[2] Oct. 2000	Root Pythium[3] Nov. 2000	Dollar Spot[3] Sept. 2001
36	Backspin	creeping	4.4	3.3	8.7	7.0
37	C951	creeping	4.4	6.0	8.3	8.3
38	SR 7100	colonial	4.3	5.3	7.0	9.0
39	Crenshaw	creeping	4.2	6.7	7.3	4.0
40	Providence	creeping	4.2	8.0	8.3	7.7
41	Penncross	creeping	3.3	6.0	9.0	8.7
	LSD at 5% =		0.6	1.1	1.4	1.3
	VELVET BENTGRASS					
1	Greenwich	velvet	6.1	3.7	6.3	---
2	MAL comp	velvet	6.0	6.0	7.7	---
3	EFD comp	velvet	5.8	6.0	5.3	---
4	MAM comp	velvet	5.7	6.0	7.3	---
5	DSV comp	velvet	5.7	3.3	7.7	---
6	MAC comp	velvet	5.5	6.0	7.3	---
7	SR7200	velvet	5.3	6.7	6.3	---
8	SRX7EW57-23	velvet	4.9	7.0	8.7	---
9	SRX7EWRIVI	velvet	4.8	7.3	8.7	---
	LSD at 5% =		0.6	1.3	1.2	---

[1]9 = best turf quality
[2]9 = best establishment
[3]9 = least disease
[4]Mixture between velvet and colonial bentgrass, velvet and creeping bentgrass, or velvet, colonial and creeping bentgrass with equal weights of each.

Table 9. Performance of bentgrass cultivars and selections in a fairway/tee trial seeded in September 2000 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2001 Avg.	Establish-ment[2] Oct. 2000	Brown Patch[3] June 2001	Dollar Spot[3] Sept. 2001	Color[4] Dec. 2001
1	C953	creeping	7.8	4.7	9.0	7.7	7.7
2	C952	creeping	7.4	5.7	9.0	8.0	6.7
3	CIS AC-1	velvet	6.9	6.7	9.0	9.0	5.3
4	SR 7200	velvet	6.7	6.0	9.0	9.0	5.7
5	CIS AC-1/AT-5	vel/col[5]	6.5	7.0	9.0	8.7	5.0
6	C954	creeping	6.3	6.3	9.0	7.3	6.7
7	Penn A-4	creeping	6.2	7.3	9.0	6.3	6.3
8	Pick 96-2	creeping	6.1	7.0	9.0	5.3	5.0
9	CIS AC-1/AP-5	vel/cr[5]	6.1	6.3	9.0	8.7	5.7
10	Brighton	creeping	5.9	6.7	9.0	6.7	6.3
11	Penn G-2	creeping	5.9	6.3	9.0	7.7	7.0
12	SRX 1DIN	creeping	5.8	6.3	9.0	6.3	5.3
13	CIS AT-5	colonial	5.8	8.0	8.3	9.0	5.3
14	CIS AC-1/AP-5/AT-5	vel/col/cr[5]	5.7	6.3	9.0	9.0	5.3
15	Pick ECB	creeping	5.7	5.3	9.0	7.3	5.3
16	Crenshaw	creeping	5.6	7.3	9.0	6.0	6.7
17	SR 1119	creeping	5.5	8.0	9.0	7.0	3.0
18	00-108	creeping	5.5	6.3	9.0	6.3	3.7
19	L93	creeping	5.4	6.3	9.0	7.7	4.0
20	SRX 1COCR	creeping	5.3	6.7	9.0	6.0	5.3
21	SRX 1BPAA	creeping	5.3	6.3	9.0	7.0	6.0
22	Cato	creeping	5.3	6.3	8.3	7.7	4.7
23	SRX 1NJH	creeping	5.1	6.3	9.0	7.0	3.3
24	SRX 1EW46-12	creeping	5.1	6.3	9.0	7.0	6.3
25	Providence	creeping	4.8	7.7	8.7	7.0	5.0
26	C951	creeping	4.7	5.3	9.0	7.0	3.3
27	Pennlinks	creeping	4.6	7.0	9.0	7.3	3.7
28	Southshore	creeping	4.2	7.3	9.0	7.7	3.7
29	Syn RHU	creeping	3.9	5.0	9.0	8.0	4.7
30	Penncross	creeping	3.7	7.3	9.0	7.3	3.0
31	Syn ORE	creeping	3.7	5.0	9.0	7.3	4.0
32	Syn ORM	creeping	3.7	4.0	9.0	8.3	3.3
	LSD at 5% =		0.9	1.5	NS	1.6	1.8

Table 9 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 2001 Avg.	Establish-ment[2] Oct. 2000	Brown Patch[3] June 2001	Dollar Spot[3] Sept. 2001	Color[4] Dec. 2001
		COLONIAL AND DRYLAND BENTGRASS					
1	SRX EW15-22	colonial	6.3	8.0	4.3	9.0	6.7
2	SRX 7EW81-13	colonial	5.9	6.7	5.0	9.0	6.7
3	Syn-9BC	colonial	5.8	5.7	6.3	9.0	6.0
4	SRX 7MOBB	colonial	5.8	7.3	7.3	9.0	5.0
5	Syn-9BNC	colonial	5.8	6.0	7.0	9.0	5.0
6	AT-5	colonial	5.7	6.7	7.3	9.0	6.3
7	SRX 7EW81-11	colonial	5.4	7.0	5.7	9.0	7.3
8	SRX 7MODD	colonial	5.4	5.3	5.7	9.0	5.3
9	SRX 7EW65-1	colonial	5.4	6.7	4.7	9.0	6.3
10	HCD comp	colonial	5.4	6.7	7.3	9.0	5.7
11	EWT comp	colonial	5.3	6.0	5.3	9.0	4.3
12	HCE comp	colonial	5.3	7.3	7.7	9.0	6.7
13	SRX 7EW65-9	colonial	5.2	6.3	5.0	9.0	6.7
14	SR 7100	colonial	5.2	7.7	6.0	9.0	5.0
15	SRX 7EW80-19	colonial	5.2	7.0	8.0	9.0	6.7
16	SRX 7EW86-6	colonial	5.2	7.0	5.7	9.0	7.0
17	SRX 7EE25	colonial	5.1	6.3	7.0	9.0	6.7
18	NST comp	colonial	5.1	7.3	5.0	9.0	6.7
19	SRX 7CRCO	colonial	5.0	7.7	6.0	9.0	5.0
20	SRX 7EW80-6	colonial	5.0	6.7	7.3	9.0	6.3
21	SRX 7EW80-15	colonial	5.0	6.7	6.7	9.0	5.7
22	SRX 7EW81-3	colonial	5.0	6.3	7.0	9.0	5.0
23	SRX 7EE20	colonial	5.0	7.0	5.7	9.0	6.7
24	SRX 7EW17-23	creeping?	5.0	5.7	9.0	5.3	6.0
25	SRX 7EE	colonial	4.9	6.7	6.0	9.0	6.0
26	SRX 7EW65-15	colonial	4.9	6.0	5.7	9.0	5.3
27	Syn-945y	colonial	4.8	5.3	7.0	9.0	6.0
28	SRX EW 67-7	colonial	4.8	6.3	5.3	9.0	5.3
29	SRX 7EW80-17	colonial	4.8	7.3	5.7	9.0	5.3
30	SRX 7EW65-5	colonial	4.7	6.3	3.7	9.0	5.7
31	SRX 7EW65-11	colonial	4.7	6.3	4.3	9.0	6.0
32	SRX 7EW86-5	colonial	4.7	7.0	6.0	9.0	5.3
33	Syn 9FB	colonial	4.6	4.3	5.7	9.0	5.7
34	Tiger	colonial	4.5	6.7	8.3	9.0	3.7
35	SRX 7EW81-21	colonial	4.5	6.7	5.7	9.0	5.0

Table 9 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 2001 Avg.	Establish-ment[2] Oct. 2000	Brown Patch[3] June 2001	Dollar Spot[3] Sept. 2001	Color[4] Dec. 2001
		COLONIAL AND DRYLAND BENTGRASS (cont.)					
36	SRX 7EW65-3	colonial	4.4	6.7	4.7	9.0	5.3
37	Punawai	browntop	4.3	6.0	9.0	9.0	6.7
38	SRX 7DLBNN	dryland	3.9	6.3	9.0	9.0	4.3
	LSD at 5% =		0.6	1.3	2.5	0.4	1.7
		VELVET BENTGRASS					
1	Vesper	velvet	7.5	8.0	9.0	8.3	8.3
2	SR 7200	velvet	6.5	7.7	9.0	9.0	7.3
3	Greenwich	velvet	5.7	4.0	9.0	8.7	6.7
4	SRX 7EW57-23	velvet	5.3	6.7	9.0	5.7	5.3
	LSD at 5% =		0.9	1.4	NS	1.1	1.7

[1]9 = best turf quality
[2]9 = best establishment
[3]9 = least disease
[4]9 = brightest green color retention
[5]Mixture between velvet and colonial bentgrass, velvet and creeping bentgrass, or velvet, colonial and creeping bentgrass with equal weights of each.

Table 10. Yearly nitrogen (N) applied and mowing height (Ht) on bentgrass tests established at North Brunswick, NJ.

	1999		2000		2001	
	N[1]	Ht[2]	N	Ht	N	Ht
Table 1 (1998 Green)	3.5	0.16	2.6	0.16	2.4	0.250
Table 2 (1998 Fairway)	4.8	0.41	2.4	0.41	1.5	0.375
Table 3 (1998 NTEP Green)	3.7	0.16	2.6	0.16	2.4	0.125
Table 4 (1998 NTEP Fairway/Tee)	3.7	0.41	2.6	0.41	1.5	0.375
Tables 5 and 6 (1999 Green)			2.3	0.16	1.2	0.250
Table 7 (1999 Fairway)			2.3	0.41	1.2	0.375
Table 8 (2000 Green)					1.2	0.250
Table 9 (2000 Fairway)					1.6	0.375

[1]Annual N applied (lb/1000 ft^2)
[2]Mowing height in inches

Table 11. Pesticide applied in 2001 on bentgrass cultivars and selections in 1998 NTEP putting green and fairway/tee tests at North Brunswick, NJ.

Date	Pesticide Product	Product Rate (per 1000 ft^2)	Portion of Plot Treated[1]
1998 NTEP Putting Green Trial (Table 3)			
27 April	Heritage	0.4 oz	Entire
24 May	Daconil Ultrex	3.67 oz	Entire
18 June	Daconil Ultrex	7.35 oz	Front
11 July	Turcam 76	1.0 oz	Entire
12 July	Chipco 26GT	3.0 oz	
	+ Banner Maxx	1.5 oz	Entire
24 July	Merit 75WP	0.2 oz	Entire
25 July	Spectro 90	4.0 oz	
	+ Heritage	0.4 oz	Front
12 August	Daconil Ultrex	4.0 oz	Entire
21 August	Dursban Pro	1.5 oz	Entire
28 August	Chipco 26GT	4.0 oz	Front
28 September	Daconil Ultrex	3.67 oz	Entire
1998 NTEP Fairway/Tee Trial (Table 4)			
24 May	Daconil Ultrex	3.67 oz	Entire
24 May	Betasan 4E	7.35 oz	Entire
18 June	Daconil Ultrex	7.35 oz	Front
12 July	Chipco 26GT	3.0 oz	
	+ Banner Maxx	1.5 oz	Entire
24 July	Dursban Pro	2.0 oz	Entire
24 July	CGA 293343 25%	8.3 g	Entire
25 July	Spectro 90	4.0 oz	
	+ Heritage	0.4 oz	Front
28 August	Chipco 26GT	4.0 oz	Front
28 September	Daconil Ultrex	3.67 oz	Entire

[1] Entire = entire trial area was treated with the respective pesticide
Front = only the front 5/8ths of each NTEP plot was treated with the respective pesticide