2019 National Turfgrass Evaluation Program Bermudagrass Test: 2019–2023 Summary Report

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TURFGRASS RESEARCH 2024

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Summary

Kansas represents the northernmost region in the central United States where bermudagrass (*Cynodon* spp.) can be successfully grown as a perennial turfgrass. Historically, few cultivars that have both acceptable quality and adequate cold tolerance have been available to local growers. Because new introductions are continually being selected for improved hardiness and quality, both seeded and vegetative types need regular evaluation to determine their long-range suitability for use in Kansas.

Rationale

The National Turfgrass Evaluation Program (NTEP) organizes evaluation trials of turfgrass species nationwide to look at cultivar adaptation under all types of environmental conditions. Wichita, KS, was selected as a standard trial site for the 2019 National Bermudagrass Test.

Objective

The objective of this study was to evaluate seeded and vegetative bermudagrass cultivars subject to south central Kansas growing conditions and following an athletic field/home lawn maintenance schedule, and to submit data to the National Turfgrass Evaluation Program.

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Study Description

On July 9–10, 2019, 13 seeded and 22 vegetative bermudagrass cultivars and experimental accessions were planted in 105 6- × 6-ft study plots in a randomized complete block design with three replications at the Kansas State University John C. Pair Horticultural Center in Wichita, KS. Seeded plots were protected with a lightweight row cover until germination was complete (Figure 1).

Treatments

Throughout the study, irrigation was applied at approximately 1 inch per event as necessary to prevent dormancy. Once established, plots were mowed weekly throughout the growing season at 2.25 to 2.75 inches and clippings returned. We controlled insects and diseases only when they presented a threat to the trial.

In 2019 after planting, we fertilized the plots with urea (46-0-0) on August 7 at 1.0 lb N/1,000 ft^2 and August 21 at 0.5 lb N/1,000 ft^2. We applied Triplet SF herbicide on August 5 and August 15 and glyphosate herbicide between rows as needed to maintain individual plot separation.

In 2020, we applied Stonewall (prodiamine) preemergent herbicide on March 23. During the summer, we maintained fertility of the plots at 0.25 to 0.50 lb N/1,000 ft^2 per growing month. We controlled weeds as needed.

In 2021, we applied Stonewall preemergent herbicide for crabgrass control on April 7 at 1.15 lb/acre. We fertilized the plots with urea (46-0-0) at 1.0 lb N/1,000 ft^2 on April 8 and June 25. We sprayed the turf for post-emergent broadleaf weed control on May 7 with Triad Select at 4 pts/acre and on December 3 with Triad Plus at 3 pts/acre.

In 2022, we applied Stonewall preemergent herbicide for crabgrass control on April 15 at 1.15 lb/acre and then maintained plot integrity throughout the growing season using a 2% solution of glyphosate as needed. We fertilized the turf with urea (46-0-0) at 1.0 lb N/1,000 ft^2 on April 19 and July 14. We treated the plots for grubs on June 14 with imidacloprid lawn grub control at 1.6 pts/acre and immediately watered it in.

In 2023, we applied Stonewall preemergent herbicide for crabgrass control at 1.15 lb/acre on April 3 and watered it in on April 6 with 1 inch of irrigation. On April 11, we put down the broadleaf herbicide Triad Select at 4 pts/acre. We then maintained plot integrity throughout the growing season using a 2% solution of glyphosate as needed. We fertilized the turf with urea (46-0-0) at 1.0 lb N/1,000 ft^2 on April 21 and June 30. We treated the plots for grubs on June 14 with Bandit (imidacloprid) at 1.6 pts/acre and watered it in.

Data Collection

During the study, we rated spring green up, quality, genetic color, texture, the absence of seed heads, and fall color retention visually on a scale of 1 to 9 with 1 = poorest measure, 6 = acceptable, and 9 = optimum measure. We rated percent cover visually on a scale of 0% to 99%. We analyzed the data using SAS PROCs SUMMARY and ANOVA.

In 2019, we collected percent cover data on July 30, August 22, and September 26.

In 2020, we rated turf spring green up on May 5 followed by stand quality on May 26, June 23, July 21, August 26, and September 23. We rated the plots for absence of seed heads on June 23, genetic color on August 12, and texture on September 30. We collected percent cover data on May 26, July 22, and September 29.

In 2021, we rated turf spring green up on May 12 followed by stand quality on June 1, July 2 (Figure 2), July 28, August 25, and September 28. We rated the plots for genetic color on August 2, texture on October 6, and fall color retention on October 20. We collected percent cover data on May 26, July 27, and November 9.

In 2022, we rated turf spring green up on May 6 (Figure 3) followed by stand quality on May 18, June 15, July 13, August 16, and September 28. We rated the plots for absence of seed heads on August 16, genetic color on August 17, texture on August 17, and fall color retention on October 25. We collected percent cover data on May 18, July 13, and September 28.

In 2023, we rated turf spring green up on May 9 followed by stand quality on May 24, June 27, July 25, August 30, and September 20. We rated the plots for absence of seed heads on July 26, genetic color on July 26, texture on August 15, and fall color retention on October 13 (Figures 4a and 4b). We collected percent cover data on May 24, August 8, and September 27.

Results

In 2019, at three weeks, six weeks, and eleven weeks after planting, we collected percent cover data on the study as a measure of cultivar establishment (Table 1). On our initial rating, we found that seeded types DLF-460/3048 and JSC 2013-5S and vegetative type 'Celebration Hybrid' (MSB-1017) were the best established. On August 22, seeded types DLF-460/3048, JSC 2013-5S, P5T-R6TM, and 'Sun Queen' (PST-R6MM) and vegetative types 'Celebration Hybrid' (MSB-1017) and MSB-1042 were the best established. By the end of the 2019 growing season, seeded types 'Sun Queen' (PST-R6MM), DLF-460/3048, and P5T-R6TM and vegetative types 'Celebration Hybrid' (MSB-1017), MSB-1048, and OKC1666 were the best established. The winter of 2019 affected the establishment of the different cultivars in the study so that on May 6, 2020, seeded types JSC 2013-8S and JSC 2013-12S and vegetative types MSB-1042 and 'Celebration Hybrid' (MSB-1017) rated the highest percent cover. By July 22, 2020, the plots had recovered from the effects of

the 2019 winter. At that time, vegetative type 'Celebration Hybrid' (MSB-1017) and MSB-1048 seeded type 'Sun Queen' (PST-R6MM) showed the best percent cover. On September 27, 2023, at the end of the study, vegetative varieties 'Celebration Hybrid' (MSB-1017), FB 1902, MSB-1042, MSB-1048, OKC1666, and OKC1876 and seeded varieties JSC 2013-10S, JSC 2013-7S, and OKS2015-1 showed complete plot coverage.

We started the 2020–2023 growing seasons by rating the bermudagrass plots in May for spring green up (Table 2). At that time, vegetative types 'Tahoma 31' and 'Latitude 36' and seeded type JSC 2013-10S averaged the greenest. During the summers of 2020–2023, we rated the turf monthly for quality from the end of May through the end of September. Quality ratings were influenced by degree of cover, weed infestation, and disease resistance as well as turf color, texture, and density. In averaged monthly ratings, vegetative types, MSB-1042 and OKC1406 looked the best in May, OKC1666 in June, 'Tiftuf 'in July, OKC1666 in August, and OKC1666 in September. Of the seeded types, JSC 2013-10S and 'Riviera' looked the best in May, 'Riviera' in June, JSC 2013-10S in July, 'Riviera' in August, and JSC 2013-10S in September. On average, the best overall performers across all summers were vegetative type OKC1666 and seeded type JSC 2013-10S.

During the 2020–2023 summers, we looked at turf genetic color and texture (Table 3) and found that vegetative varieties MSS-1075 and FB 1903 on average were the darkest green and that the darkest green seeded variety was JSC 2013-7S. Vegetative type OKC1666 had the finest texture. We rated seed head display during the summers of 2020, 2022, and 2023 and found that, on average, vegetative varieties MSB-1050 and MSB-1026 had the fewest seed heads. Of the seeded types, 'Riviera' and OKS2015-3 had the fewest seed heads. Shortly after first frost in 2021, 2022, and 2023, we rated fall color retention and found that vegetative variety OKC1666 retained its color the longest. Of the seeded types, OKS2015-1 retained its color the best.

Bermudagrass cover for some cultivars deteriorates over the winter and then improves again during the growing season. As cover variability could be indicative of winter hardiness, we decided to compare percent cover in September 2019, 2020, 2021, and 2022 with percent cover in May and July of the subsequent year to look at over-winter variability and speed of recovery from possible winter damage (Table 3). On average, the cultivars with the least over-winter variability (least percent cover change from September to May) were vegetative type OKC1666 and MSB-1042 and seeded type 'Riviera' and JSC 2013-12S. The worst performers were vegetative types MSB-1050, MSS-1075, FB 1902, and FB 1903. By July, the stands with the average best cover were vegetative types MSB-1042 and OKC1666 and seeded types JSC 2013-12S and 'Riviera'. Of the worst performers, MSB-1050, FB 1902, MSS-1075, and FB 1903 showed the best recovery between May and July.

Complete 2019 National Bermudagrass Test results and more information on NTEP can be found online at: *https://www.ntep.org/*.

Table 1. July 30, August 22, and September 26, 2019, May 26 and July 22, 2020, and September 27, 2023, percent cover[1] as a measure of bermudagrass cultivar establishment at Wichita, KS. Data sorted by best percent cover, July 22, 2020.

Cultivar/ Experimental Number	Seeded/ Vegetative	% Cover					
		7/30/19	8/22/19	9/26/19	5/26/20	7/22/20	9/27/23
*Celebration Hybrid (MSB-1017)[2]	V	40.0	80.0	97.0	80.0	99.0	99.0
*Sun Queen (PST-R6MM)	S	63.3	93.3	99.0	81.7	98.3	91.7
MSB-1048	V	20.7	66.7	95.7	76.7	98.3	99.0
*Riviera	S	30.3	89.3	97.7	85.0	97.7	92.7
JSC 2013-10S	S	38.3	80.0	96.3	80.0	97.7	99.0
MSB-1042	V	26.7	76.7	94.0	81.7	97.7	99.0
OKC1406	V	19.7	43.3	90.0	75.0	97.7	96.3
JSC 2013-8S	S	63.3	91.0	97.7	87.7	97.0	97.7
OKC1682	V	10.7	12.0	83.3	75.0	97.0	97.7
*Tiftuf	V	26.7	45.0	93.3	70.0	96.3	97.7
DLF-460/3048	S	76.7	93.3	98.3	71.7	96.3	97.7
FB 1628	V	12.3	31.7	86.7	56.7	96.3	97.7
FB 1902	V	11.3	45.0	90.0	45.0	95.7	99.0
JSC 2013-5S	S	71.7	93.3	97.0	80.0	95.7	97.7
JSC 2013-7S	S	63.3	84.3	97.7	83.3	95.7	99.0
P5T-R6TM	S	53.3	93.3	98.3	60.0	95.3	93.0
JSC 2013-12S	S	43.3	83.3	96.3	86.7	95.0	93.0
OKC1876	V	23.3	58.3	91.7	76.7	94.7	99.0
OKS2015-1	S	26.7	68.3	94.3	75.0	94.7	99.0
OKS2015-3	S	22.0	89.3	94.7	85.0	94.7	89.7
MSB-1050	V	23.7	70.0	94.0	36.7	94.3	91.3
*Astro	V	25.0	38.3	91.7	53.3	94.0	84.7
*Monaco	S	56.7	89.3	95.3	83.3	94.0	94.3
*Tifway	V	21.7	43.3	88.3	68.3	94.0	96.0
FB 1630	V	21.3	56.7	90.0	48.3	93.7	86.7
MSB-1026	V	20.3	26.7	88.3	61.7	93.3	93.0
OKS2015-7	S	16.0	71.7	92.7	66.7	93.0	88.3
JSC 80V	V	17.3	45.0	86.7	58.3	92.3	93.0
OKC1666	V	20.0	55.0	95.0	76.7	90.7	99.0
*Tahoma 31	V	14.7	51.7	88.3	60.0	88.3	94.3
OKC1873	V	11.7	38.3	85.0	61.7	88.3	94.3
*Latitude 36	V	14.7	38.3	90.0	66.7	87.3	86.7
FB 1903	V	9.7	36.7	78.3	31.7	81.7	76.7

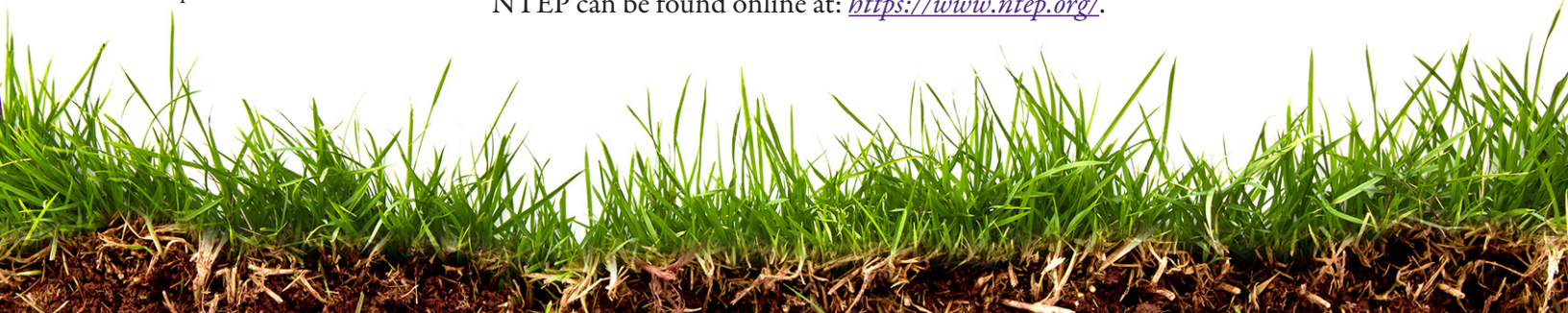K-STATE
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Table 1. July 30, August 22, and September 26, 2019, May 26 and July 22, 2020, and September 27, 2023, percent cover[1] as a measure of bermudagrass cultivar establishment at Wichita, KS. Data sorted by best percent cover, July 22, 2020.

Cultivar/ Experimental Number	Seeded/ Vegetative	% Cover					
		7/30/19	8/22/19	9/26/19	5/26/20	7/22/20	9/27/23
JSC 77V	V	19.0	23.3	73.3	38.3	80.0	94.3
MSS-1075	V	17.3	41.7	88.3	36.7	80.0	83.3
LSD[3]		13.9	12.6	11.2	16.0	7.6	13.9

[1] Percent cover was rated visually on a scale of 0% to 100%.
[2] Cultivars marked with "*" are commercially available.
[3] To determine statistical differences among entries, subtract one entry's mean from another's. If the result is larger than the corresponding least significant difference (LSD) value, the two are statistically different.

Table 2. 2020–2023 average spring greenup and quality of bermudagrass cultivars at Wichita, KS.[1] Data sorted by best overall average quality.

Cultivar/ Experimental Number	Seeded/ Vegetative	Spring Green up	Quality					
			May	Jun.	Jul.	Aug.	Sep.	Avg.
OKC1666	V	4.7	5.4	7.3	5.9	6.8	5.9	6.3
*Latitude 36[2]	V	5.4	5.1	6.7	6.0	6.3	5.6	5.9
MSB-1042	V	4.5	5.8	6.6	5.8	6.3	5.3	5.9
*Tiftuf	V	4.0	5.1	6.5	6.3	6.0	5.7	5.9
JSC 2013-10S	S	5.3	5.3	5.8	6.2	6.3	5.9	5.9
JSC 80V	V	5.2	5.4	6.7	5.9	6.1	5.3	5.9
*Riviera	S	4.8	5.2	5.9	5.7	6.7	5.8	5.8
JSC 2013-12S	S	4.7	5.1	5.6	6.0	6.5	5.7	5.8
*Monaco	S	4.2	4.8	5.8	5.5	6.3	5.8	5.6
OKC1406	V	5.0	5.7	6.5	5.3	6.2	4.5	5.6
JSC 2013-8S	S	4.5	5.1	5.5	5.8	6.1	5.2	5.5
JSC 77V	V	4.4	4.4	5.5	5.4	6.5	5.8	5.5
JSC 2013-5S	S	4.8	5.0	5.6	5.5	6.2	5.3	5.5
OKS2015-3	S	4.8	5.1	5.6	5.4	5.9	5.5	5.5
JSC 2013-7S	S	4.3	4.8	5.3	5.8	5.8	5.3	5.4
*Astro	V	4.1	4.2	5.6	5.7	6.2	5.3	5.4
OKC1682	V	4.8	4.7	5.6	5.3	5.7	5.4	5.3
*Tahoma 31	V	5.8	5.0	5.5	4.9	5.8	5.3	5.3
OKS2015-1	S	4.9	4.7	5.7	5.4	5.8	5.1	5.3
OKC1873	V	2.8	3.4	5.3	5.8	6.2	5.3	5.2
*Tifway	V	3.2	4.3	5.8	5.6	5.7	4.5	5.2

Table 2. 2020–2023 average spring greenup and quality of bermudagrass cultivars at Wichita, KS.[1] Data sorted by best overall average quality.

Cultivar/ Experimental Number	Seeded/ Vegetative	Spring Green up	Quality					
			May	Jun.	Jul.	Aug.	Sep.	Avg.
FB 1628	V	3.9	4.5	5.1	5.4	5.7	5.0	5.1
*Sun Queen (PST-R6MM)	S	3.8	4.0	5.0	5.1	6.0	5.3	5.1
OKC1876	V	3.4	4.2	5.3	5.5	5.6	4.5	5.0
DLF-460/3048	S	3.9	4.2	5.2	5.3	5.5	4.8	5.0
OKS2015-7	S	4.9	4.4	4.8	4.8	5.7	5.0	4.9
*Celebration Hybrid (MSB-1017)	V	2.9	4.3	5.5	5.0	5.3	4.4	4.9
FB 1902	V	2.7	3.2	4.9	5.2	5.9	5.2	4.9
MSB-1048	V	1.5	3.2	5.8	4.9	5.7	4.6	4.8
P5T-R6TM	S	2.9	3.5	4.6	5.3	5.7	5.1	4.8
FB 1630	V	3.0	3.4	4.3	5.2	5.8	5.1	4.8
MSB-1026	V	3.6	3.6	4.6	4.8	4.8	4.5	4.5
FB 1903	V	1.9	2.5	3.6	4.8	5.9	5.4	4.5
MSB-1050	V	1.4	2.3	4.1	4.5	4.8	4.2	4.0
MSS-1075	V	2.4	2.3	3.2	3.5	3.9	3.5	3.3
LSD[3]		0.7	0.5	0.5	0.6	0.6	0.5	0.4

[1] Visual ratings were based on a scale of 1 to 9 (1 = poorest measure, 6 = acceptable, and 9 = optimum measure).
[2] Cultivars marked with "*" are commercially available.
[3] To determine statistical differences among entries, subtract one entry's mean from another's. If the result is larger than the corresponding least significant difference (LSD) value, the two are statistically different.

Table 3. 2020–2023 average genetic color, texture, absence of seed heads, and fall color retention[1]; 2019–2023 average fall percent cover[2], 2020–2023 average spring percent cover, and 2020–2023 average summer percent cover of bermudagrass cultivars at Wichita, KS. Data sorted by best overall average quality.

Cultivar/ Experimental Number	Seeded/ Vegetative	Gen. Color	Texture	Seed Heads	Fall Color	% Cover		
						Fall	Spring	Summer
OKC1666	V	4.1	8.3	7.0	5.8	90.2	81.7	91.2
*Latitude 36[3]	V	5.3	7.4	7.6	3.6	84.5	71.7	85.2
MSB-1042	V	5.5	7.9	8.1	4.3	94.0	81.7	92.1
*Tiftuf	V	5.9	6.8	5.8	4.7	95.3	73.9	94.1
JSC 2013-10S	S	6.7	6.0	5.7	3.7	91.3	78.9	91.1
JSC 80V	V	4.8	7.4	6.7	3.6	86.3	70.4	85.8
*Riviera	S	5.8	6.2	6.9	3.4	88.4	79.4	89.2

Table 3. 2020–2023 average genetic color, texture, absence of seed heads, and fall color retention[1]; 2019–2023 average fall percent cover[2], 2020–2023 average spring percent cover, and 2020–2023 average summer percent cover of bermudagrass cultivars at Wichita, KS. Data sorted by best overall average quality.

Cultivar/ Experimental Number	Seeded/ Vegetative	Gen. Color	Texture	Seed Heads	Fall Color	% Cover		
						Fall	Spring	Summer
JSC 2013-12S	S	6.4	5.8	5.8	3.1	90.0	80.3	88.5
*Monaco	S	6.7	6.0	6.3	3.0	88.2	75.0	88.3
OKC1406	V	5.2	6.5	5.3	3.8	92.6	71.4	92.4
JSC 2013-8S	S	6.6	5.6	5.2	2.8	93.3	79.2	91.1
JSC 77V	V	5.5	6.5	5.2	3.2	80.7	63.9	84.8
JSC 2013-5S	S	7.0	5.8	5.7	3.4	95.0	78.9	91.5
OKS2015-3	S	5.8	5.9	6.9	3.3	89.2	74.4	90.4
JSC 2013-7S	S	7.4	6.0	4.4	3.0	94.8	76.4	91.5
*Astro	V	4.1	6.2	7.4	4.1	88.2	65.0	88.8
OKC1682	V	6.2	6.9	7.2	3.9	89.3	76.4	93.4
*Tahoma 31	V	7.3	6.3	6.9	3.4	90.9	71.7	88.5
OKS2015-1	S	6.1	5.6	6.1	4.2	91.9	73.9	90.8
OKC1873	V	5.6	6.3	7.7	5.3	87.3	65.0	88.4
*Tifway	V	6.7	6.7	7.1	4.4	92.6	68.3	91.6
FB 1628	V	7.8	5.8	4.4	4.3	92.1	62.8	92.2
*Sun Queen (PST-R6MM)	S	5.1	5.6	5.0	2.8	95.5	75.9	91.1
OKC1876	V	6.3	6.8	6.6	3.9	95.3	73.3	94.0
DLF-460/3048	S	5.6	5.9	5.6	3.0	91.3	73.7	91.5
OKS2015-7	S	5.8	5.0	5.6	3.0	86.3	70.6	85.2
*Celebration Hybrid (MSB-1017)	V	6.9	7.2	8.1	3.4	97.3	66.7	96.0
FB 1902	V	7.2	5.5	4.3	3.7	92.4	49.4	92.0
MSB-1048	V	6.9	7.8	7.7	3.9	97.4	60.6	96.2
P5T-R6TM	S	5.3	5.5	5.2	3.2	85.0	63.9	85.1
FB 1630	V	7.8	4.7	3.8	3.2	90.4	51.1	86.8
MSB-1026	V	7.6	6.2	8.3	4.0	91.8	65.0	88.4
FB 1903	V	8.6	4.8	5.9	3.9	77.1	36.7	75.0
MSB-1050	V	7.5	6.6	8.6	2.9	91.1	33.9	86.4
MSS-1075	V	8.8	5.5	5.2	4.2	83.3	37.2	77.7
LSD[4]		0.5	0.5	0.6	0.5	8.3	9.8	5.8

[1] Visual ratings were based on a scale of 1 to 9 (1 = poorest measure, 6 = acceptable, and 9 = optimum measure).
[2] Percent cover was rated visually on a scale of 0% to 100%.
[3] Cultivars marked with "*" are commercially available.
[4] To determine statistical differences among entries, subtract one entry's mean from another's. If the result is larger than the corresponding least significant difference (LSD) value, the two are statistically different.
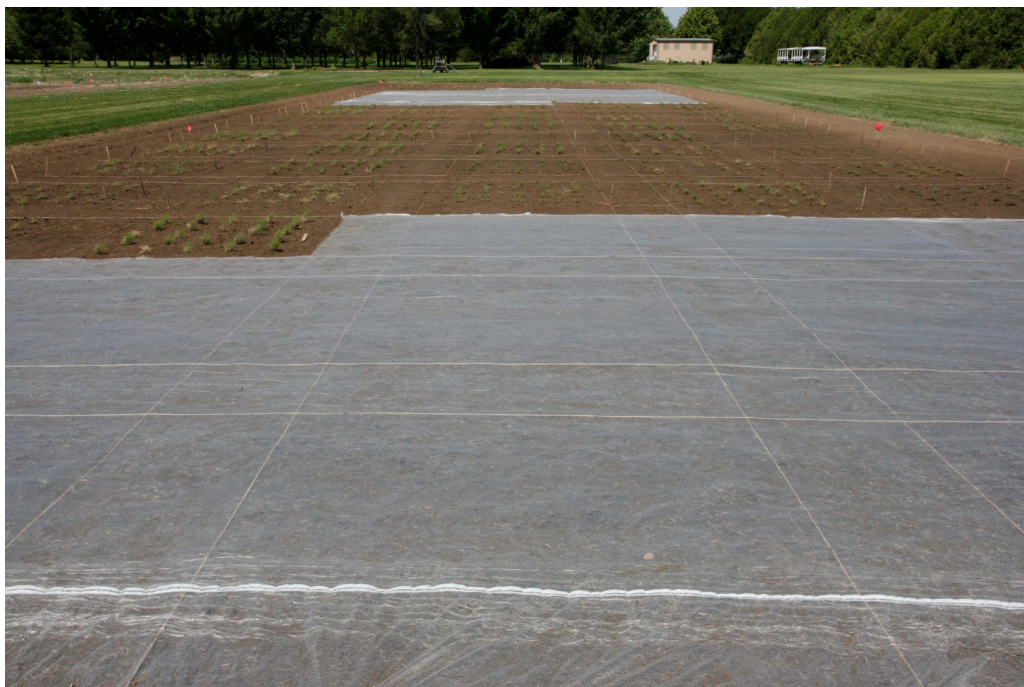
Figure 1. Newly planted 2019 National Turfgrass Evaluation Program Bermudagrass Test at the John C. Pair Horticultural Center in Wichita.

Figure 2. Appearance of 2019 National Turfgrass Evaluation Program Bermudagrass Test plots at the John C. Pair Horticultural Center in Wichita on July 2, 2021.

Figure 3. Appearance of 2019 National Turfgrass Evaluation Program Bermudagrass Test plots at the John C. Pair Horticultural Center in Wichita on May 6, 2022, showing variability of spring greenup between cultivars.

Figures 4a and 4b. Examples of two 2019 National Turfgrass Evaluation Program Bermudagrass Test plots at the John C. Pair Horticultural Center in Wichita on October 13, 2023, showing differences in patterns of fall color retention.