Colorant Effects on Dormant Buffalograss Turf Performance

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SUMMARY. **Dormant buffalograss (*Buchloë dactyloides*) turfs, grown under field conditions, were treated with a colorant and evaluated for turfgrass color, quality, and cover. In addition, turfgrass canopy and soil temperatures were measured. Colorant treatments improved turfgrass color and quality when compared to the untreated control, and resulted in a color response that appeared similar to cool season turfgrasses growing in areas adjacent to the studies. Colorant treatments increased canopy and soil temperatures, and enhanced spring green-up. These results support the use of colorants as a means of extending the green appearance, and enhancing dormant buffalograss turf performance.**

Buffalograss is native to the Great Plains of North America, ranging from Mexico to Canada (Beetle, 1950; Gould, 1979; Hitchcock, 1951; Reeder, 1971). It grows mostly on upland areas with fine- to medium-textured soils and is used as a forage, conservation, and turfgrass species (Riordan et al., 1998; Stubbendieck et al., 1992). Buffalograss is perennial, stoloniferous, and sod forming with light gray-green color. It turns light tan to straw color when entering winter dormancy (Beard, 1973). Riordan (1991) reported acceptance of buffalograss, as a turfgrass species, was limited by its extended dormancy, particularly in northern climates. Colorants can be used to dye dormant turfgrasses to extend their green appearance and enhance turfgrass performance (Henry and Gibeault, 1985; Van Dam, 1972; Van Dam and Kurtz, 1971; Youngner and Fuchigami, 1958). Similarly, colorants can be used as a temporary measure to enhance the appearance of turfs damaged by disease, insects, or other stresses (Beard, 1973). In this study, field trials were conducted to determine the effect of a turfgrass colorant on enhancing buffalograss color, quality, and spring green-up during periods of extended, winter dormancy.

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Materials and methods

In 2001, buffalograss turfs were not completely dormant until mid to late November in eastern Nebraska, where this study was conducted. Turfgrass colorant (LESCO Green; LESCO, Strongsville, Ohio) was applied on 10 Dec. 2001 to dormant buffalograss turfs at 2.63 mL·m^{-2} (8.25 fl oz/1000 ft^2) and 5.25 mL·m^{-2} (16.5 fl oz/1000 ft^2), or label- and twice label-recommended rates. Colorant treatments were compared to an untreated control. A randomized complete-block design with treatments replicated three times was used in all experiments. Treatment plot size was 4.6 m × 9.1 m (15 ft × 30 ft). Studies were conducted at the John Seaton Anderson Turfgrass Research Facility located near Ithaca, Nebr., and at a sod farm located near Mead, Nebr. Two experiments were conducted at each site. In the first experiment, treatments were applied to turf mowed at 63.5 mm (2.5 inches) and the second to turfs mowed at 25.4 mm (1.0 inch). Mowing heights were maintained during the growing season up to the time winter dormancy occurred.

Turfgrass color, quality, cover, spring green-up, and soil and canopy temperature data were collected for all experiments. Turfgrass color and spring green-up ratings were based on a 1–9 visual rating scale with 1 = straw brown, 6 = light green, and 9 = dark green. Turfgrass quality ratings were based on a 1–9 visual rating scale with 1 = poorest, 5 = acceptable, and 9 = best. A visual rating of 1–9 was used for turfgrass cover assessment, where 1 = 0 to 10% and 9 = 90% to 100% turfgrass groundcover. Turfgrass canopy temperatures were taken with an infrared thermometer (model #OS86A-LS; Omega Engineering, Stamford, Conn.). Canopy temperatures were measured between 1100 and 1300 h on cloudless days. Soil temperature measurements were taken with Dickson (model SK 500; Dickson Co., Addison, Ill.) temperature loggers placed at the 50.8 mm (2 inches) soil depth.

Data were subjected to analysis of variance and means were separated, using least significant difference at the 0.05 probability level (SAS, 1999). Data from mowing height experiments were examined for the feasibility of combining using the Hartley F max test (Hartley, 1950).

Results

Based on the results of the Hartley F max test (Hartley, 1950), turfgrass color, density, quality and spring green-up data for the experiments conducted at the 25.4- and 63.5-mm mowing heights were combined for each study location (Table 1). Turfgrass colorant treatments applied at manufacturer label rate and twice the label rate improved visual color ratings for all dates and in both test locations, when compared to the untreated control (Table 1).

Ratings for colorant-treated turfs declined with time, but were always better than the untreated control (Table 1). Youngner and Fuchigami (1958) observed a similar response on bermudagrass (*Cynodon dactylon*) colorant studies conducted in California. Untreated control turfs remained straw brown during the study. During winter and early spring, colorant-treated turfs appeared medium to light green, and by early April had a similar appearance to semidormant kentucky bluegrass (*Poa pratensis*) turfs growing in sites adjacent to the studies.

Turfgrass colorant treatments improved visual quality ratings, when compared to the untreated control treatments (Table 2). Turfgrass cover was not influenced by colorant treatments. Since the buffalograss turf was dormant and not trafficked, this response might be anticipated. Turfgrass quality ratings were primarily influenced by enhanced color, and mirrored those values obtained in color ratings (Tables 1 and 2). There were

Table 1. The effect of turfgrass colorant treatments on dormant buffalograss turfgrass color ratings at Todd Valley Farm and John Seaton Anderson (JSA) Turfgrass Research Facility, located near Mead and Ithaca, Nebr., respectively.

Colorant treatment[y]	Turfgrass color[z] 2001 17 Dec.	2002 2 Jan.	15 Jan.	28 Jan.	27 Feb.	11 Mar.	5 Apr.	23 Apr.
				Todd Valley Farm Trial				
1×	4.0	3.0	4.0	5.0	3.0	2.5	2.5	3.5
2×	6.3	5.5	6.3	6.5	4.5	3.5	3.5	5.3
Untreated	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5
LSD (0.05)	0.8	0.6	0.5	0.6	0.6	0.8	0.6	0.5
				JSA Turfgrass Research Facility Trial				
1×	3.0	3.0	3.3	4.0	3.2	2.8	3.0	3.5
2×	5.8	5.6	6.2	5.8	5.4	4.8	5.0	5.8
Untreated	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.8
LSD (0.05)	0.6	0.5	0.4	0.7	0.5	0.4	0.6	0.5

[z]Turfgrass color ratings were based on a 1–9 visual rating scale with 1 = straw brown, 6 = light green, and 9 = dark green.
[y]Colorant treatments were applied at once and twice label-recommended rates and were compared to an untreated control.

no negative effects on turfgrass quality ratings from treatments receiving twice the label-recommended rate in these studies. The colorant treatments had no apparent phytoxicity on the buffalograss as it greened up in the spring.

Buffalograss plants began green-up earlier in the colorant-treated vs. untreated turfs (Tables 1 and 2). Green-up was rate dependent with twice the label-recommended rate having higher values than the label-recommended rate treatment (Table 2). Turfs receiving colorant treatment began green-up 2 weeks earlier than the untreated controls. This response carried forward with improved turfgrass quality and cover ratings until the June ratings were taken (data not shown). Green-up responses were positively correlated with increased soil temperatures at the 50.8-mm soil depth (Table 3).

Discussion

The extended dormancy of buffalograss and resulting straw-brown color limits its potential acceptance and use as a turfgrass species in northern portions of the Great Plains (Riordan, 1991). Colorant treatments used in this study resulted in a winter and early spring appearance for the dormant buffalograss turf that was similar to kentucky bluegrass. Such appearance would be considered acceptable, since kentucky bluegrass is the most commonly used turfgrass species in this region. These results support the use of a turfgrass colorant to enhance buffalograss color and quality during periods of extended dormancy. Colo-

Table 2. The effect of turfgrass colorant treatments on dormant buffalograss turfgrass quality and cover at Todd Valley Farm and John Seaton Anderson (JSA) Turfgrass Research Facility, located near Mead and Ithaca, Nebr., respectively.

Colorant treatment[x]	Quality[z] 2002 15 Jan.	28 Jan.	23 Apr.	Cover[y] 2002 15 Jan.	28 Jan.	23 Apr.
			Todd Valley Farm Trial			
1×	6.2	6.5	7.0	6.2	7.0	7.6
2×	6.8	7.8	7.8	6.2	7.2	7.8
Untreated	3.0	3.0	5.0	6.6	7.0	7.6
LSD (0.05)	0.6	0.8	0.7	NS	NS	NS
			JSA Turfgrass Research Facility Trial			
1×	6.0	6.5	7.0	6.0	6.0	7.0
2×	6.8	7.5	7.0	6.3	7.0	7.0
Untreated	3.0	3.0	5.5	6.3	7.0	7.0
LSD (0.05)	0.7	0.8	0.9	NS	NS	NS

[z]Turfgrass quality ratings were based on a 1–9 visual rating scale with 1 = poorest, 6 = acceptable, and 9 = best.
[y]Turfgrass cover was based on a 1–9 visual rating scale with 1 = 0 to 10% and 9 = 90% to 100% groundcover.
[x]Colorant treatments were applied at once and twice label-recommended rates and were compared to an untreated control.

Table 3. The effect of turfgrass colorant treatments on soil temperature and spring green-up in a dormant buffalograss grown at Todd Valley Farm and John Seaton Anderson (JSA) Turfgrass Research Facility, located near Mead and Ithaca, Nebr., respectively.

Colorant treatment[x]	Soil temp (°F)[z] 5 Apr. 2002	23 Apr. 2002	Spring green-up[y] 23 Apr. 2002
		Todd Valley Farm Trial	
1×	39.8	41.0	3.3
2×	42.7	44.1	4.5
Untreated	34.3	37.0	2.0
LSD (0.05)	1.8	2.3	0.6
		JSA Turfgrass Research Facility	
1×	36.3	38.6	2.8
2×	39.0	39.8	3.3
Untreated	33.2	34.0	1.5
LSD (0.05)	2.3	2.8	0.8

[z]Soil temperature was taken at the 50.8-mm depth (2 inches) depth; (°F – 32)/1.8 = °C.
[y]Spring green-up was based on a visual rating scale with 1 = straw brown, 6 = light green, and 9 = dark green.
[x]Colorant treatments were applied at once and twice label-recommended rates and were compared to an untreated control.

rant treatments enhanced turfgrass spring green-up by increasing canopy and soil temperature. This response allowed the treated buffalograss turf to initiate growth earlier in the growing season than the untreated control. Turfgrass managers desiring a green appearance for dormant buffalograss should consider the use of a colorant. More research is needed to assess the potential effects of repeat application and higher rates of colorant treatment on buffalograss.

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