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Topdressing and aerification programs on creeping bentgrass fairways

by

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ABSTRACT. The proper timing of topdressing and aerification for creeping bentgrass fairways and the effect that these two cultural practices have on soil physical properties have not been fully assessed. The first objective of this study was to determine the optimum timing of topdressing and aerification for golf course fairways. The second objective was to determine if varying schedules of topdressing and aerification influence the extent to which soil physical properties change following freeze-thaw cycles. The two year field study was conducted at Ames, IA, and Fargo, ND on established creeping bentgrass (*Agrostis stolonifera* L.) maintained at fairway mowing height. The study included three topdressing treatments: a control, with no topdressing; 0.25 inches topdressing in the fall; and 0.25 inches topdressing in the spring plus 0.25 inches in the fall. Six aerification treatments including a control, spring one pass, fall one pass, spring two passes, fall two passes, and spring one pass plus fall one pass were also evaluated. Soil bulk density decreased during both over winter periods at both locations from 4 to 6% (Table 1), however, topdressing and aerification treatments did not consistently influence over-winter soil bulk density change. Topdressing and aerification increased turf quality at North Dakota but not Iowa (data not shown). Soil in plots aerified in the fall had 4% lower soil strength than those aerified in the spring at both sites (Table 2). Soil in aerified plots had a 48% increase in water infiltration as compared to the control at North Dakota but no increase was observed at Iowa (Table 2).

Table 1. Soil bulk density in Iowa and North Dakota. Soil bulk density is the average of 54 plots.

Rating	Iowa (g cm^{-3})[†]	North Dakota (g cm^{-3})
Fall 2006	1.40a[†]	1.57a
Spring 2007	1.35b	1.45c
Fall 2007	1.40a	1.52b
Spring 2008	1.36b	1.45c

[†]Means in columns followed by the same letter are not different at $P \leq 0.05$.

Table 2. Physical properties of soil in response to spring or fall aerification with one or two passes. Soil Bulk density (BD) is the average of 12 replicates from Fargo, ND. Change in soil bulk density (ΔBD) of 2006-2007 and 2007-2008 winters are the means from each of two sites (Ames, IA and Fargo, ND). Soil strength (Strength) is a mean of five rating dates (Fall 2006, Spring 2007, Fall 2007, Spring 2008, and June 2008) in two sites (Ames, IA and Fargo, ND). Infiltration measurement at North Dakota averaged over four rating periods (Fall 2006, Spring 2007, Fall 2007, and Spring 2008).

	BD ($g\ cm^{-3}$)	ΔBD ($g\ cm^{-3}$)[†]		Strength	Infiltration (cm/hr)
Aerification treatment	North Dakota	06-07	07-08	(MPa)	North Dakota
Control	1.53	-0.04	-0.09	1.01	15.1
Spring 1 pass	1.51	-0.07	-0.04	1.01	20.7
Fall 1 pass	1.52	-0.08	-0.05	0.97	31.3
Spring 2 passes	1.49	-0.07	-0.07	0.99	28.3
Fall 2 passes	1.50	-0.09	-0.04	0.94	29.8
Spring 1 + fall 1 pass	1.51	-0.07	-0.05	0.96	34.4
Orthogonal contrasts					
Control vs. all	**[‡]	*	**	*	**
Spring vs. fall	NS	NS	NS	**	NS
2 passes vs. 1 pass	NS	NS	NS	NS	NS

[†]ΔBD change of bulk density was determined by subtracting fall BD from spring BD.

[‡]NS,*,** nonsignificant or significant at $P \leq 0.05$ or 0.01, respectively.