Assessing the Effects of Winter Overseeding on Newer Bermudagrasses

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The overall goal of these field studies was to fill important knowledge gaps regarding the effects of winter overseeding on bermudagrass. Specific research questions were: (1.) What is the physiological impact of winter overseeding on bermudagrass carbohydrate reserves/winter survival? (2.) What are the optimal strategies/techniques for overseeding the newest group of cold-hardy bermudagrassess (e.g. Latitude 36)?

STUDY I: This study was conducted at four locations (Fayetteville, AR; West Lafayette, IN; Lexington, KY and Blacksburg, VA) representing a wide geographic spectrum of where bermudagrass is overseeded for golf and athletic turf. Mature stands of bermudagrass (Riviera, Patriot, Tifway) were overseeded at three seeding rates; 0, 15 and 30 pounds of seed/1000 ft^2 using a high quality perennial ryegrass blend (Futura 2000: Pickseed USA-Halsey, OR). Carbohydrate status of bermudagrass stolon/rhizome was determined by harvesting plugs as the turf acclimated to winter (e.g. mid-Dec.) and broke dormancy (e.g. March/April). Ground tissue was analyzed for total non-structural carbohydrates (TNC) and other sugars by the turf physiology laboratory at Virginia Tech. In addition, soil temperature at the crown level was measured using data logging temperature probes (e.g. Hobo Sensor/Temperature probes; Onset Corp.).

STUDY II. In a separate companion study in West Lafayette, IN, questions related to overseeding practices for the newest group of cold-hardy bermudagrasses (e.g. Latitude 36 and Northbridge) will be evaluated. Evaluations will include a range of overseeding treatments (e.g. seeding rates ranging from 15-60 pounds of seed per 1000 ft^2) starting in late-summer. Additionally, seeding variations like multiple dates (e.g. 20+20+20, 14 days apart) and strategies to facilitate seed soil contact (e.g. brushing, incorporating sand topdressing with seed, etc.) will be studied. Latitude 36 and Northbridge were planted from stolons in mid-Summer, 2015. Due to the very mild summer conditions full coverage of bermudagrass did not occur. This phase has been delayed until late-summer 2016 when a fully mature bermudagrass is available. The following will be measured: Visual estimates of perennial ryegrass establishment as well as

periodic digital image analysis for green cover. Spring appearance/density, and occurrence of winter diseases (e.g. *Microdochium* patch, etc.) will also be monitored.

Results: Winter overseeding had positive effects on the general appearance of the overseeded plots (e.g. green turf present), but also clear negative effects on bermudagrass spring green-up and stand density (Figure 1). Stolon tissue samples across all four locations are still being analyzed for carbohydrate status but some early trends from the West Lafayette site have emerged (Table 1). As expected total carbohydrate status declined with time and values ranged from 73 to 34 mg g^{-1} tissue. The starch portion of the carbohydrates followed a similar pattern of decline with time and values ranged from 36 to 28 mg g^{-1} tissue. The overall effect of overseeding was less clear and consistent, but there was a significant decrease in starch for the Dec. sampling in turf oveseeded with 30 pounds of seed 1000 ft^2 compared to the 0 and 15 pounds of seed. This study will continue into the 2015-2016 growing season.

Table 1. Carbohydrate status of Patriot bermudagrass stolons on three sampling dates as affected by three perennial ryegrass winter overseeding rates, West Lafayette, IN.

	Bermudagrass stolon carbohydrates ‡					
	Total non-structural carbohydrates			Starch		
Overseeding rate†	Dec 2014	Mar 2015	Apr 2015	Dec 2014	Mar 2015	Apr 2015
# seed/1000 ft^2	---------- (mg g^{-1} tissue) ----------					
0	79.5 a	48.6 a	36.0 a	37.9 a	37.3 a	30.0 a
15	79.2 a	48.6 a	36.5 a	38.5 a	39.7 a	29.4 a
30	59.9 a	51.7 a	29.4 a	31.8 b	32.4 a	25.4 a
Overall mean	72.9 A	49.6 B	34.0 C	36.1 A	36.5 A	28.3 B

†Winter overseeding occurred on 15 Sept., 2014 where the seed was applied with 0.5 ft^3 of sand topdressing and immediately brushed into the turf canopy with a stiff bristle broom.
Means in the same column followed by the same lowercase letter and means in the same row within each carbohydrate category followed by the same uppercase letter are not significantly different according to Fisher's protected LSD (p=0.05).

Summary:

- Winter overseeding of bermudagrass improves the visual appearance and potentially playability at four locations across the South and transition zone climates.
- Winter overseeding at either 15 or 30 pounds of seed/1000 ft^2 resulted in less dense bermudagrass the following spring after a selective transitioning herbicide was applied.
- The effect of winter overseeding on bermudagrass stolon carbohydrate status is still being determined, but there was a decline in December starch concentrations for turf overseeded at 30 pounds of seed/1000 ft^2 compared to 0 or 15 pounds of seed/1000 ft^2 at the West Lafayette study site.

Figures 1. Logging soil temperature probes were installed at the turf crown/soil interface to monitor soil temperatures during the study.

Figure 2. Winter appearance of a bermudagrass turf overseeded with three rates of perennial ryegrass (0, 15, 30 pounds of seed/1000 ft2).

Figure 3. Turf plugs were harvested during bermudagrass acclimation to winter dormancy (e.g. Dec.) and breaking dormancy (e.g. April) and analyzed for stolon carbohydrate status.

Figure 4. Spring green-up and density of bermudagrass turf in Lexington, KY (June 2015) showing the negative effects of overseeding on spring turf density following an application of a transitioning herbicide.