### Ryegrass Overseeding Effects on Bermudagrass Physiology

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### Abstract

Bermudagrass (Cynodon dactylon L.) is the warm-season turf species of choice for much of the South and transition zone regions for golf course fairways, tees and athletic fields. It forms a durable, persistent turf that can be closely mowed but also becomes straw-brown during dormancy. Turf managers frequently overseed bermudagrass with cool-season species to provide a green winter color and sometimes for playability reasons. This field study conducted at four locations (Blacksburg, VA; Fayetteville, AR; Lexington, KY; and West Lafayette, IN) evaluated the effects of three perennial ryegrass overseeding rates (0, 735, 1470 kg ha⁻¹) on bermudagrass carbohydrate status and surface soil temperatures. Winter overseeding had positive effects on the general appearance of the overseeded turf but also negative effects on spring density at some locations. Stolon tissue was analyzed for carbohydrate status and at the West Lafayette site total carbohydrate status declined with time and values ranged from 73 to 34 mg g⁻¹ tissue. The starchy portion of the carbohydrates followed a similar pattern of decline with time and values ranged from 36 to 28 mg g⁻¹ tissue. Surface soil temperature effects were somewhat variable with only slight increases (+0.5 °C) in the overseeded plots at the Lexington and Fayetteville sites. This study demonstrates the potential negative effects of overseeding on bermudagrass health and need for further investigations into the cultural management practices that maximize overseeded bermudagrass health and winter survival.

### Results and Summary

- Winter overseeding of bermudagrass improved the visual appearance and potentially playability at each of the four locations.
- Overseeding at either 735 or 1470 kg ha⁻¹ 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 at the West Lafayette location showed slight temporal differences with progression of the dormancy. There was, however, a decline in December starch concentrations for turf overseeded at 1470 kg ha⁻¹ compared to 0 or 735 kg ha⁻¹. This study was repeated in West Lafayette in 2015 and 2016 and analyses are continuing.
- Only a slight temperature increase (+0.5 °C) was measured in the overseeded turf compared to the non-overseeded turf at some locations. This increase may not be practically important.

### Winter overseeding: Why is it practiced?

- **Superior winter aesthetics (green color)**
- **Improved playability (recovery, traction, drier surfaces?, etc.)**
- **Possible protection from severe winter temperatures (insulation, absorption of solar radiation?)**

### What we know and/or think we know:

- Perennial ryegrasses are the species of choice for overseeding bermudagrass fairways or athletic fields.
- Suggested planting rates range from 245-1470 kg ha⁻¹ (Goatley et al., 2008; McCarty, 2016). It is uncommon for some athletic fields to receive much more.
- Overseeded areas often have density/coverage issues the following spring compared to non-overseeded areas with possible influence of seeding rates.
- Bermudagrass requires approximately 60-100 days of no competition to fully recover/replenish carbohydrates (Askew, 2010). Selective herbicides are often used to chemically remove the overseeded species and maximize the opportunity for improving health.

### Knowledge gap:

What effect "if any" does the practice of winter overseeding have on the physiological health of the bermudagrass plant? Does this practice alter the plant’s carbohydrate status (positively or negatively) that will influence spring green-up and/or recovery?

### Experimental Approach:

Four widely separated sites where bermudagrass is grown and overseeded for fall/spring testing throughout the transition zone were selected for this study. Bermudagrass was overseeded at three rates (0, 735 and 1470 kg ha⁻¹) in Sept. 2014 with a high quality ryegrass blend (Futura 2000; Pickseed USA-Halsey, OR). Data: Ryegrass cover, bermudagrass cover the following spring, surface soil temperatures at the soil/stem interface (e.g. crown) monitored with data logging temperature probes and temporal stem tissue carbohydrate status evaluated using ground tissue in the turf physiology laboratory at Virginia Tech. Treatments were planted in a randomized complete block with a minimum of three replications.

### References: