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Updating Winter Overseeding Technologies

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The introduction of hybrid bermudagrass (*Cynodon dactylon* x *C. transvaalensis*) cultivars that can sustain high shoot densities at cutting heights of 1/8 to 1/10 in. (3.2–2.5 mm) has raised questions concerning potential problems in achieving successful winter overseedings. Basically, it relates to the very high shoot density, which increases the difficulty in placement of seed into the canopy at a depth where successful seed germination and seedling growth can be achieved. Detailed investigations were initiated by the International Sports Turf Institute to address this issue. The investigations were conducted in three distinctly different locations: (a) Indian Ridge Golf and CC in Palm Desert, California—a hot-dry climate, (b) Point Hilton at Tapatio Cliff in Phoenix, Arizona—a hot-humid inland climate, and (c) Bentwater CC in Montgomery, Texas—a warm-humid coastal climate. All three experimental sites consisted of Champion vertical-dwarf hybrid bermudagrass grown on a high-sand root zone. Representative cultural practices for putting greens were followed both pre- and post-winter overseeding, including a 1/8 in. (3.2 mm) height of cut during the winter playing season. The pre- and post-winter overseeding cultural practices utilized assumed that play would continue throughout this phase, except for a two-day period during the actual seeding process.

The species composition and planting rates for the twelve individual treatments included the following:

- 100% Winterplay rough bluegrass (*Poa trivialis*) at seeding rates of 2, 4, 8, and 18 lb/1,000 ft^2 (1, 2, 4, and 9 kg/100 m^2).
- 100% Charger II perennial ryegrass (*Lolium perenne*) at 25 lb/1,000 ft^2 (12.5 kg/100 m^2).
- 100% Penncross creeping bentgrass (*Agrostis stolonifera*) at 1 and 4 lb/1,000 ft^2 (0.5 and 2 kg/100 m^2).
- Four cultivar blends/species mixtures with the following composition:
  - an 80% blend of perennial ryegrass and 20% rough bluegrass mixture seeded at rates of 6 and 12 lb/1,000 ft^2 (3 and 6 kg/100 m^2).
  - an 80% rough bluegrass and 20% creeping bentgrass mixture at 12 lb/1,000 ft^2 (6 kg/100 m^2).
  - a 75% rough bluegrass and 25% creeping bentgrass mixture with an additional increment of rough bluegrass seeded one month later representing 10 plus 2 lb/1,000 ft^2 (5 + 1 kg/100 m^2).

Additional treatments involved comparisons of the timing of seeding methodology. This included a traditional calendar date timing, which was compared to use of a biological prediction model, which is when the soil temperature at a 4-in. (100 mm) depth was between 72 and 78°F (22–26°C).

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Species Composition and Seeding Rates

These studies conducted at three distinct locations with three replications at each site have provided the following definitive guidelines as to the methodology for winter overseeding of Champion high-density hybrid bermudagrass. The three top-ranked species/seeding rates were: a top-ranked mixture of **75% rough bluegrass and 25% creeping bentgrass followed in 30 days by an additional seeding of rough bluegrass representing a seeding rate of 10 plus 2 lb/1,000 ft^2 (5 +1 kg/100 m^2).** Ranking second most successful was a mixture of **80% rough bluegrass and 20% creeping bentgrass seeded at a rate of 12 lb/1,000 ft^2 (6 kg/100 m^2).** The third best seeding treatment was **100% rough bluegrass seeded at 8 lb/1,000 ft^2 (4 kg/100 m^2).** Those treatments containing perennial ryegrass ranked lowest in turf quality at all three sites.

Timing of Winter Overseeding and Spring Transition

A comparison of methodologies to achieve the most favorable timing for seeding revealed that the biological prediction model is far preferred. That is, **it is best to winter overseed when the soil temperature at a 4-in. (100 mm) depth is between 72 and 78°F (22–26°C).**

In terms of spring transition, all treatments transitioned successfully with good turf density and color sustained throughout that phase. **This transition was achieved strictly by cultural treatments which were initiated when the soil temperature at a 4-in. (100 mm) depth reached 62°F (17°C).** The spring transitional cultural program consisted of the following: (1) **doubling the nitrogen fertilization rate during the transition period,** (2) **a distinct lowering of the mowing height,** (3) **a one-time core cultivation,** and (4) a **weekly vertical cutting and light topdressing.** Note that the soil moisture level was maintained at a nonstress level throughout the transition period.

This research at multiple locations shows that the **new high-density bermudagrass cultivars used on putting greens can be successfully winter overseeded, providing that some modifications in the methodology are employed.**

Understanding Chill Stress Injury

James B Beard

The injury of grasses at low or suboptimum temperatures in the absence of freezing is termed chill injury. The chill-susceptible grasses are of subtropical and tropical origin. Chill stress typically occurs in the temperature range of 55 to 60°F (13–16°C), depending on the grass species. All stages of growth and development of the entire above-ground plant are susceptible, and this susceptibility limits the season of shoot growth.

Typical chill injury symptoms involve a rapid disruption of the chloroplast-chlorophyll complex, thereby causing the leaves to turn tan to white in color, but remain in an erect position. Certain cultural practices can be utilized to reduce the severity of chill injury. They include (a) maintaining a moderately high nitrogen nutritional level, (b) ensuring a moist soil condition, and (c) selecting chill-resistant species and cultivars.

Chill resistance is the ability of the grass plant to survive a chill stress of down to 50°F (10°C) without any loss of green color. Both species and cultivars within a species of warm-season turfgrasses may vary in chill resistance. In contrast, the cool-season turfgrasses are chill-insensitive. The relative chill stress resistances of 14 warm-season grasses are presented in the accompanying table.

Relative Chill Stress Resistance	Turfgrass
good	American buffalograss
	tropical carpetgrass
	serangoongrass
	St. Augustinegrass
	kikuyugrass
moderate	common carpetgrass
	seashore paspalum
	bahiagrass
	mascarene zoysiagrass
	hybrid bermudagrass
	centipedegrass
	dactylon bermudagrass
poor	manila zoysiagrass
	Japanese zoysiagrass