The recent releases of the ultradwarf bermudagrass cultivars Tifdwarf (4), MS Supreme, Champion (1) and Floradwarf (5) have given superintendents new options for putting green turf. Marketed as a higher-quality alternative to Tifdwarf or Tifgreen, the new bermudagrasses (Cynodon hybrids) often have high shoot densities, fine leaf texture, prostrate growth and short internodes, all of which enable them to withstand lower mowing heights while maintaining high turf quality.

However, controlled evaluations of these different cultivars are hard to find, and only a few published studies have looked at the management of ultradwarf bermudagrass cultivars (2,3). Thus, the objective of our study was to evaluate how two different management schemes and two different nitrogen sources affect ultradwarf bermudagrass performance and quality.

The study was conducted in Auburn, Ala., on a native soil (loamy sand) push-up putting green. Five bermudagrasses were evaluated: MS Supreme, Tifdwarf, Floradwarf, Champion and Tifgreen. The study began in May 1999, when sod was stripped from all the grasses to bring them to a uniform thatch depth. In June 1999, nitrogen treatments began in which two different nitrogen sources were applied to deliver the same total nitrogen rate: 1 pound of nitrogen per 1,000 square feet per month.

Nitrogen sources were soluble (urea)
In the study, debris from vertical mowing with a Graden machine was raked from plots and removed, and aerification cores were ground up and swept back into the plots.

and slow-release (liquid methylene urea). All nitrogen was applied as a spray, with the soluble source applied every two weeks (½ pound of nitrogen per 1,000 square feet every two weeks) and the slow-release source applied once a month (1 pound of nitrogen per 1,000 square feet per month).

In July 1999, the two programs of management treatments began. The standard management consisted of two vertical mowings per year (June, August) at a 1-inch depth, plus topdressing, one core aerification (June) and a monthly summer spiking (from July to September). High management was monthly summer vertical mowing (from June to September) at ½ inch, plus light topdressing, monthly summer core aerification (from June to September) and

### Thatch depth

The cultivars Tifdwarf and MS Supreme tended to have thinnest thatch depths (shown in millimeters), whereas all others had similar depths, regardless of the sampling date.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Aug '99</th>
<th>Oct '99</th>
<th>Dec '99</th>
<th>Feb '00</th>
<th>Apr '00</th>
<th>Jun '00</th>
<th>Aug '00</th>
<th>Oct '00</th>
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</thead>
<tbody>
<tr>
<td>Champion</td>
<td>22.8 ab</td>
<td>18.3 a</td>
<td>19.5 a</td>
<td>20.3 a</td>
<td>18.6 a</td>
<td>18.6 b</td>
<td>17.2 a</td>
<td>16.9 a</td>
</tr>
<tr>
<td>Tifeagle</td>
<td>20.8 c</td>
<td>18.1 ab</td>
<td>19.0 a</td>
<td>20.4 a</td>
<td>17.2 ab</td>
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<tr>
<td>Floradwarf</td>
<td>21.6 bc</td>
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<td>18.8 a</td>
<td>19.8 a</td>
<td>18.3 a</td>
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<td>17.5 a</td>
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<tr>
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<td>22.0 abc</td>
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<td>17.2 b</td>
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<td>15.6 c</td>
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<td>14.2 b</td>
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<td>17.7 ab</td>
<td>18.2 ab</td>
<td>19.0 a</td>
<td>17.9 a</td>
<td>16.4 c</td>
<td>14.5 b</td>
<td>14.3 b</td>
</tr>
</tbody>
</table>

Within each date, cultivars followed by the same letter are not significantly different.
monthly light topdressing.

Every treatment combination had three replicates. A Graden machine provided the vertical mowing treatments. Debris from vertical mowing was raked from plots and removed, and aerification cores were ground up and swept back into the plots. All applied sand topdressing was hand-swept into verticut grooves or aerification holes.

The green was mowed at heights ranging from 1/8 to 1/3 inch, varying with time of year and with the variation in grass species actively growing on the green. Every fall, the entire green was overseeded with *Poa trivialis* at 10 pounds of seed per 1,000 square feet. No additional treatments were applied to prepare the surface for overseeding; the plots were mowed, and seed was broadcast applied, followed by light topdressing.

Collected data included twice-monthly color and quality ratings, thatch depth and shoot-density counts. Shoot-density counts were obtained by removing six randomly selected 1/4-inch-diameter plugs from each plot and counting all the *Poa trivialis* and bermudagrass shoots in each plug.

**Results**

*Thatch depth*

Thatch depth was most affected by bermudagrass cultivar, but nitrogen source or management scheme sometimes affected thatch depth. The cultivars Tifgrass and MS Supreme tended to have lesser thatch depths, whereas all others had similar thatch depth, regardless of the sampling date. Typical thatch depths (including mat) during the study ranged from 1/8 to 1/4 inch.

Interestingly, in 1999, turf that was maintained under the high-management program often had greater thatch depth than turf maintained under the standard. Two possible explanations exist: First, the standard-management plots were vertically mowed more deeply than the high-management plots, so the added depth in the standard plots could have removed more thatch, even though the plots were not verticut as frequently. Second, adding more topdressing to the high-management plots might have deepened and dispersed the thatch layer through sand buildup.

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### 2001 treatments

Drops in quality occurred after vertical mowing or core aeration were performed.

**High management**

- Champion
- Tifgrass
- Floradwarf
- MS Supreme
- Tifgrass

**Standard management**

- Champion
- Tifgrass
- Floradwarf
- MS Supreme
- Tifgrass
By July 2000, however, this effect was gone. For the remainder of the study, management program did not affect thatch depth.

Nitrogen source had very little effect on thatch depth in this study. Nitrogen source affected thatch depth only once, in June 2000, when plots sprayed with urea (soluble nitrogen) had more thatch than was observed in plots that received a slow-release nitrogen source.

*Bermudagrass quality*

Cultivar, management program and nitrogen source all played an important role in bermudagrass quality throughout the study. Across most cultivars, the standard-management plots received higher quality ratings except when vertical mowing took place just before rating. For example, on Aug. 27, 1999, the high-management plots had an overall quality rating of 4.8 compared with the standard plots, which had an overall rating of 4.0. This was because the standard-management plots had been vertically mowed one week before the ratings, on Aug. 18. By Sept. 23, the standard-management plots had recovered and had higher quality scores, with an average of 5.0 compared with the high-management plots, which had an average score of 3.4.

Both management programs usually produced better turf quality after application of the soluble nitrogen source. Quality was improved most by soluble nitrogen because a flush of growth occurred after each application. This growth spurt often healed the damage.

*All applied sand topdressing was hand-swept into verticutter grooves or aerification holes.*
of vertical mowing more quickly than did the slow-release source.

Because there were always significant two-way interactions in this study (cultivar vs. N source, and cultivar vs. management program), it is difficult to talk about the quality or color of individual cultivars. No single cultivar consistently outperformed the others, and no cultivar consistently had poorer color or quality.

In general, in 1999, Champion and MS Supreme were at the top in quality rankings, regardless of the management program. A similar trend continued in 2000, but differences on account of cultivar were so small that they were rarely significant.

**Shoot density**

In every month of shoot count data in 1999 and 2000, Tifdwarf had the fewest bermudagrass shoots per square centimeter. In July, when the bermudagrasses were actively growing, Champion usually had the highest shoot density. Cultivar choice had the greatest effect on bermudagrass shoot density, whereas management program and nitrogen source had very little or no effect.

The dense texture of the ultra-dwarfs did not affect *Poa trivialis* shoot density. There was no reduction in overseed shoot density in the ultra-dwarf bermudagrasses, compared with Tifdwarf. The overseed shoot density counts also demonstrate the ability of *Poa trivialis* to survive well into the summer, as shoots were still left in the bermudagrass in July 2000.

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**Shoot densities**

In every month that shoots were counted in 1999 and 2000, Tifdwarf had the fewest bermudagrass shoots per square centimeter. Champion often had the most. *Poa trivialis* shoot counts varied little when sown into various cultivars.

<table>
<thead>
<tr>
<th></th>
<th>Dec '99</th>
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<th>May '00</th>
<th>Jul '00</th>
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</tr>
</tbody>
</table>

Within each sampling date and grass species, numbers followed by the same letter are not significantly different from each other.

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**Literature cited**